

Contents

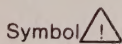
Chapter 1 – 2270/2290 Diagnostic Programs

Chapter 2 – DEC XXDP+ User Manual

Chapter 3 – Mini-Calibration Package

2270/2290 Diagnostics

Form 2270-0115-B



IEC 417

Symbol on equipment signifies that the manual contains information to prevent injury or equipment damage.

© GenRad 1981

Concord, Massachusetts, U.S.A. 01742

February, 1981

Preface

This manual is divided into 3 chapters, each with its own Table of Contents and Appendix. The first chapter consists of a description of the 2270 and 2290 Diagnostics Programs. Included are procedures for using these programs to test boards, modules, LSI-11 memories, disks, etc.

The second chapter describes software consisting of a monitor to load and run programs, utility programs to maintain files, a text editor to create and edit files, and instructions for using Supervisor Diagnostics to test various devices.

The third chapter describes a Mini-Calibration Package used to test and calibrate the ACZ, DCM, DCS, and D/S Reference Modules within the 2270.

NOTE

The material in this manual is for informational purposes only and is subject to change without notice. GenRad assumes no responsibility for any errors or for consequential damages that may result from the use or misinterpretation of any of the procedures in this publication.

CHAPTER 1

2270/2290 DIAGNOSTIC PROGRAMS



Digitized by the Internet Archive
in 2025

https://archive.org/details/manualsplus_05810

Contents—Chapter 1

Section and Paragraph	Page	Section and Paragraph	Page
1 INTRODUCTION			
1.1 Scope of Manual	1-1	2.2.18 Relay Ground Driver Test	2-14
1.2 Related Publications	1-2	2.2.19 Measurement Module Tests	2-14
1.3 List of 2270/2290 Diagnostic Programs	1-2	2.2.20 Driver/Sensor Reference Calibration and Verification	2-15
1.4 List of Additional Programs	1-5	2.2.21 Driver/Sensor Controller Board Test	2-15
1.5 Description of 2270 Diagnostic Programs	1-6	2.2.22 Slave Controller Board Test	2-16
1.6 Description of 2290 Diagnostic Programs	1-7	2.2.23 Driver/Sensor Board Test	2-17
2 DIAGNOSTIC PROGRAM USE		2.3 2290 Diagnostics	2-19
2.1 General	2-1	2.3.1 Set-Up Procedures	2-19
2.2 2270 Diagnostics	2-1	2.3.2 2290 Verification	2-20
2.2.1 Set-Up Procedures	2-1	2.3.3 PDP 11/34 0-124 K Memory Exerciser (optional)	2-20
2.2.2 LSI-11/02 Processor Basic Instructions Test	2-2	2.3.4 LA 36 DECwriter Test (optional)	2-21
2.2.3 LSI-11/02 EIS Test	2-2	2.3.5 Line Printer Test (optional)	2-21
2.2.4 LSI-11/02 FIS Test	2-2	2.3.6 Hawk Disk Drives and Controller Test	2-21
2.2.5 LSI-11/02 Traps Test	2-3	APPENDIX	
2.2.6 LSI-11/02 MOS Memory Test	2-3	A.1 Hard Copy Directory (2270)	A-1
2.2.7 LSI-11/23 CPU Test	2-4	A.2 Hard Copy Directory (2290)	A-1
2.2.8 LSI-11/23 MMU Test	2-4	A.3 Help Text (2270)	A-1
2.2.9 LSI-11/23 128 K Memory Test	2-4	A.4 Disk Pack Formatter and Surface Verifier (2270)	A-1
2.2.10 LSI-11/23 128 K Memory Exerciser	2-5	A.5 Manual Disk Boot (2270)	A-3
2.2.11 Display Test	2-6	A.6 Manual Disk Boot to any Drive (2270)	A-3
2.2.12 LSI-11/02 - 11/23 IEEE Options Test	2-8	A.7 Manual Floppy Diskette Boot (2270)	A-4
2.2.13 CDC Hawk Disk Drive and Dynus Controller Test	2-9	A.8 XXDP+ Monitor	A-5
2.2.14 Data Reliability and Drive Integrity	2-11	A.9 Chain Mode Operation	A-5
2.2.15 LSI-11/02 QAFC Test	2-12	A.10 Floppy Drive System Test	A-11
2.2.16 Strip Printer Interface Test	2-12	A.11 DSD Floppy Disk Drive Diagnostic Procedure	A-12
2.2.17 Clock Timer Board Test	2-13	A.12 Additional Information	A-14

Contents - Chapter 1

Page	Section and Paragraph	Page	Section and Paragraph
1-1	Introduction to the Chapter	1-1	Introduction to the Chapter
1-2	Objectives of the Chapter	1-2	Objectives of the Chapter
1-3	Scope of the Chapter	1-3	Scope of the Chapter
1-4	Organization of the Chapter	1-4	Organization of the Chapter
1-5	Summary of the Chapter	1-5	Summary of the Chapter
1-6	References	1-6	References
1-7	Appendix A	1-7	Appendix A
1-8	Appendix B	1-8	Appendix B
1-9	Appendix C	1-9	Appendix C
1-10	Appendix D	1-10	Appendix D
1-11	Appendix E	1-11	Appendix E
1-12	Appendix F	1-12	Appendix F
1-13	Appendix G	1-13	Appendix G
1-14	Appendix H	1-14	Appendix H
1-15	Appendix I	1-15	Appendix I
1-16	Appendix J	1-16	Appendix J
1-17	Appendix K	1-17	Appendix K
1-18	Appendix L	1-18	Appendix L
1-19	Appendix M	1-19	Appendix M
1-20	Appendix N	1-20	Appendix N
1-21	Appendix O	1-21	Appendix O
1-22	Appendix P	1-22	Appendix P
1-23	Appendix Q	1-23	Appendix Q
1-24	Appendix R	1-24	Appendix R
1-25	Appendix S	1-25	Appendix S
1-26	Appendix T	1-26	Appendix T
1-27	Appendix U	1-27	Appendix U
1-28	Appendix V	1-28	Appendix V
1-29	Appendix W	1-29	Appendix W
1-30	Appendix X	1-30	Appendix X
1-31	Appendix Y	1-31	Appendix Y
1-32	Appendix Z	1-32	Appendix Z

Introduction - Section 1

1.1 SCOPE OF MANUAL.....	1-1
1.2 RELATED PUBLICATIONS.....	1-2
1.3 LIST OF 2270/2290 DIAGNOSTICS PROGRAMS.....	1-2
1.4 LIST OF ADDITIONAL PROGRAMS.....	1-5
1.5 DESCRIPTION OF 2270 DIAGNOSTIC PROGRAMS.....	1-6
1.6 DESCRIPTION OF 2290 DIAGNOSTIC PROGRAMS.....	1-7

1.1 SCOPE OF MANUAL

This manual is designed to provide the Field Service Engineer and GenRad Maintenance Trained Users with the necessary instructions to effectively use the Diagnostic Package.

The Diagnostic Package will enable the isolation of failures or the verification of the function of individual modules and peripherals associated with the 2270 and 2290 systems.

This manual contains:

- . A directory listing of the DEC, GenRad-modified DEC and GenRad diagnostic programs with a brief description of each where necessary.
- . A more detailed description of the DEC and GenRad modified DEC diagnostics for the processor cages and drives.
- . A thorough explanation of the use of the diagnostics.
- . An Appendix containing instructions and explanations useful in the effective further use of the diagnostic package.
- . An Addendum containing a DEC explanation of the uses of XXDP+.
- . A Minicalibration Procedure to be used on the AC and DC measurement modules as well as the Driver Sensor Reference Module of the 2270.

This Diagnostic Package is an adaptation of programs and procedures intended for factory use. As such, certain criteria must be set for field use. Namely, system acceptance is based solely on the successful running of the OVP and this Diagnostic Package should not be considered as any part of an acceptance criteria.

Introduction - Section 1

The purpose of this document is to provide a comprehensive overview of the project's objectives, scope, and deliverables. This section outlines the key goals and the structure of the report, ensuring that all stakeholders are aligned on the project's direction and expectations.

1.1 Project Overview

This section provides a high-level summary of the project, including its background, the problem it aims to solve, and the overall goals. It also identifies the key stakeholders and the project's strategic importance.

The project is designed to address the challenges faced by the organization in the current market environment. By implementing the proposed solution, we aim to improve operational efficiency, reduce costs, and enhance customer satisfaction.

1.2 Project Objectives

The primary objectives of the project are to develop a robust system that meets the following criteria: scalability, security, and ease of integration with existing infrastructure.

Key performance indicators (KPIs) will be used to measure the success of the project, including system uptime, response time, and user adoption rates.

The project is expected to be completed within a timeline of six months, with regular progress updates provided to the steering committee.

The project team consists of experts in software development, system architecture, and project management, ensuring a high level of expertise and collaboration throughout the project lifecycle.

The following sections provide a detailed breakdown of the project's components, including the system architecture, development process, and testing strategy.

This document serves as a reference for all project-related activities and is intended to be updated as the project progresses. It is the responsibility of the project manager to ensure that this document remains accurate and relevant.

The project is a critical initiative for the organization, and its successful completion is essential for achieving our long-term strategic goals. We are committed to transparency and communication throughout the project, ensuring that all stakeholders are kept informed of the latest developments and any potential risks.

1.2 RELATED PUBLICATIONS

The publications necessary for the effective use of the Diagnostic Package are listed below:

2270	Theory and Maintenance Manual	2270-0105 2270-0106
2270	Diagrams	2270-0108
2290	Theory and Maintenance Manual	2290-0105
2290	Diagnostics	2290-0108 2290-0109

1.3 LIST OF 2270/2290 DIAGNOSTIC PROGRAMS

The following is a directory and brief identification of the 2270 and 2290 diagnostic programs appearing on the XXDP+ medium.

<u>FILENAME</u>	<u>FUNCTION</u> (XXDP+ SYSTEM)
DY1YAO.SYS	XXDP+ System
HMDYAO.SYS	"
HDDRA1.SYS	"
HDDKAO.SYS	"
HMDKAO.SYS	"
HDDPAO.SYS	"
HDDL1.SYS	"
HDDMAO.SYS	"
HDDSAO.SYS	"
HDDTAO.SYS	"
HDDXAO.SYS	"
HDDYAO.SYS	"
HDKBAO.SYS	"
HDMMAO.SYS	"
HDMTAO.SYS	"
HDPDAO.SYS	"
HDPPAO.SYS	"

<u>FILENAME</u>	<u>FUNCTION (XXDP+ SYSTEM) (Cont.)</u>
HDPRAO.SYS	XXDP+ System
HDPTAO.SYS	"
HDDDAO.SYS	"
HDDBAO.SYS	"
HDCTAO.SYS	"
HDMSAO.SYS	"
HSAAAO.SYS	"
HUDIAO.SYS	"
GRDKAO.SYS	"

<u>FILENAME</u>	<u>FUNCTION (2270)</u>
DVKAAA.BIN	DEC LSI-11 Basic Instructions Test 11/02 ONLY
DVKABA.BIN	DEC LSI-11 EIS Instructions Test 11/02 ONLY
DVKACC.BIN	DEC LSI-11 FIS Instructions Test 11/02 Modified for 30K Memory
DVKADC.BIN	DEC LSI-11 Traps Test 11/02 Modified for 30K Memory
DVKAEB.BIN	DEC DLV11 Serial Line Unit Test 11/02
VDVCBO.BIC	DEC DLV11 11/23
DZKMAE.BIN	DEC 0 TO 128K MOS Memory Test 11/02 Modified for 30K Memory
ZKMAF1.BIC	DEC Memory Test 11/23
JKDBBO.BIN	DEC LSI-11/23 CPU Test
JKDABO.BIN	DEC LSI-11/23 MMU Test
ZICDCA.BIN	GR Console Display Test 11/02 and 11/23
DVKIBA.BIN	DEC IBV11-A IEEE I/O Bus Card Test
RKTEST.CCC	RK11/RK05 Chained Diagnostics

<u>FILENAME</u>	<u>FUNCTION</u> (2270) (Cont.)
ZRKJEO.BIC	DEC RK11 Basic Logic Test 1
ZRKKFO.BIC	DEC RK11 Basic Logic Test 2
ZRKLEO.BIC	DEC RK11/RK05 Dynamic Test
ZRKHGO.BIC	DEC RK11/RK05 Performance Exerciser
ZPQAOB.BIN	GR QAFC Test 11/02
JPQACB.BIN	GR QAFC Test 11/23
ZISPOA.BIN	GR Strip Printer Function Test 11/02
JISPCA.BIN	GR Strip Printer Function Test 11/23
ZIRTCC.BIN	GR Real Time Clock Test 11/02
JIRTCC.BIN	GR Real Time Clock Test 11/23
ZITICA.BIN	GR Timer Troubleshooting Test
ZMDSRG.BIN	GR DC Voltage and Current Source Calibration and Verification Test 11/02 or 11/23
ZMDMRG.BIN	GR DC Voltage and Current Measure Calibration and Verification Test 11/02 or 11/23
ZMACRG.BIN	GR Impedance Measure Calibration and Verification Test 11/02 or 11/23
ZMRGCB.GIN	GR Relay Ground Test 11/02
JMRGCA.BIN	GR Relay Ground Test 11/23
ZDRFRG.BIN	GR D/S Reference Calibration and Verification Test 11/02 or 11/23 and Any Digital Configuration
ZDCTOC.BIN	GR D/S Controller Test 11/02
JDCTCA.BIN	GR D/S Controller Test 11/23
ZDDSOJ.BIN	GR D/S Board Test 11/02
JDDSCA.BIN	GR D/S Board Test 11/23

<u>FILENAME</u>	<u>FUNCTION</u> (2290)
USERCK.CCC	CPU Diagnostic Chain
FKAAC0.BIC	11/34 Basic Instruction Test
FKABC0.BIC	11/34 Traps Test
FKACAO.BIC	11/34 EIS Test
ZM9BC0.BIC	Boot Board Test
CMFAF0.BIC	Memory Test
FKTHB0.BIC	11/34 MMU Test
ZDLDC0.BIC	DL11-W Serial Line/RTC
ZDZAE0.BIC	8 Line Async. MUX Test
DISKCK.CCC	Drive Diagnostic Chain
ZLACF0.BIN	LA36 DECWRITER Test
ZDZBB0.BIN	DZ Maintenance Mode Test (FS)
ZQMCFO.BIC	0-124K Memory Exerciser
FKTGB1.BIC	Memory Management Exerciser (needs board)
PWRFL.BIC	11/34 Power Fail Test
ZLPAB1.BIN	Line Printer Test

1.4 LIST OF ADDITIONAL PROGRAMS

<u>FILENAME</u>	<u>FUNCTION</u>
SETUP.BIN	SUPERVISOR MODE XXDP+
COPY1.FUN	XXDP+ COPY PROGRAM (2290 FLOPPY)
2270DX.BIN	2270 DEC EXERCISER
RKDP.BIN	XXDP WILL RESPOND TO NEW MONITOR
UPD4.BIN	XXDP UPDATE PROGRAM 4
UPD2.BIC	XXDP UPDATE PROGRAM 2
XTECO.BIN	XXDP TECO EDITOR
ZPFDCA.BIN	2270 FLOPPY DRIVE DIAGNOSTIC

<u>FILENAME</u>	<u>FUNCTION (Cont.)</u>
ZRKIF0.BIN	2270 FORMAT/VERIFIER
COPY1.BIN	COPY PROGRAM; FROM ONE XXDP+ DISK TO ANOTHER
DX1134.BIN	SYSTEM EXERCISER (2290)
- HELP.TXT	HELP TEXT

1.5 DESCRIPTION OF 2270 DIAGNOSTIC PROGRAMS

The following is a brief description of each 2270 diagnostic program that is run on the processor cage.

DVKAAA LSI-11 Basic Instruction Test: This program tests all basic instructions of the LSI11 (except trap-type) which includes Control Chip, Data Chip, Microms, PLA and other circuitry on the LSI-11 CPU module. This diagnostic does not make a pass with the T-Bit set. The trap test should also be run to completely verify the basic LSI-11.

DVKABA LSI-11 Extended Instruction Set Test: This diagnostic program tests the LSI-11 extended instruction set (ASH, ASHC, MUL, and DIV) using registers 0-5 at least once with each instruction. It is also checked that the extended instruction set can be interrupted.

DVKACC LSI-11 Floating Instruction Set Test: This diagnostic program tests the LSI-11 floating instruction set (FADD, FSUB, FMUL, and FDIV) options with fixed number patterns using each register at least once as the stack pointer. It also checks stack overflow and that the floating instruction set can be interrupted.

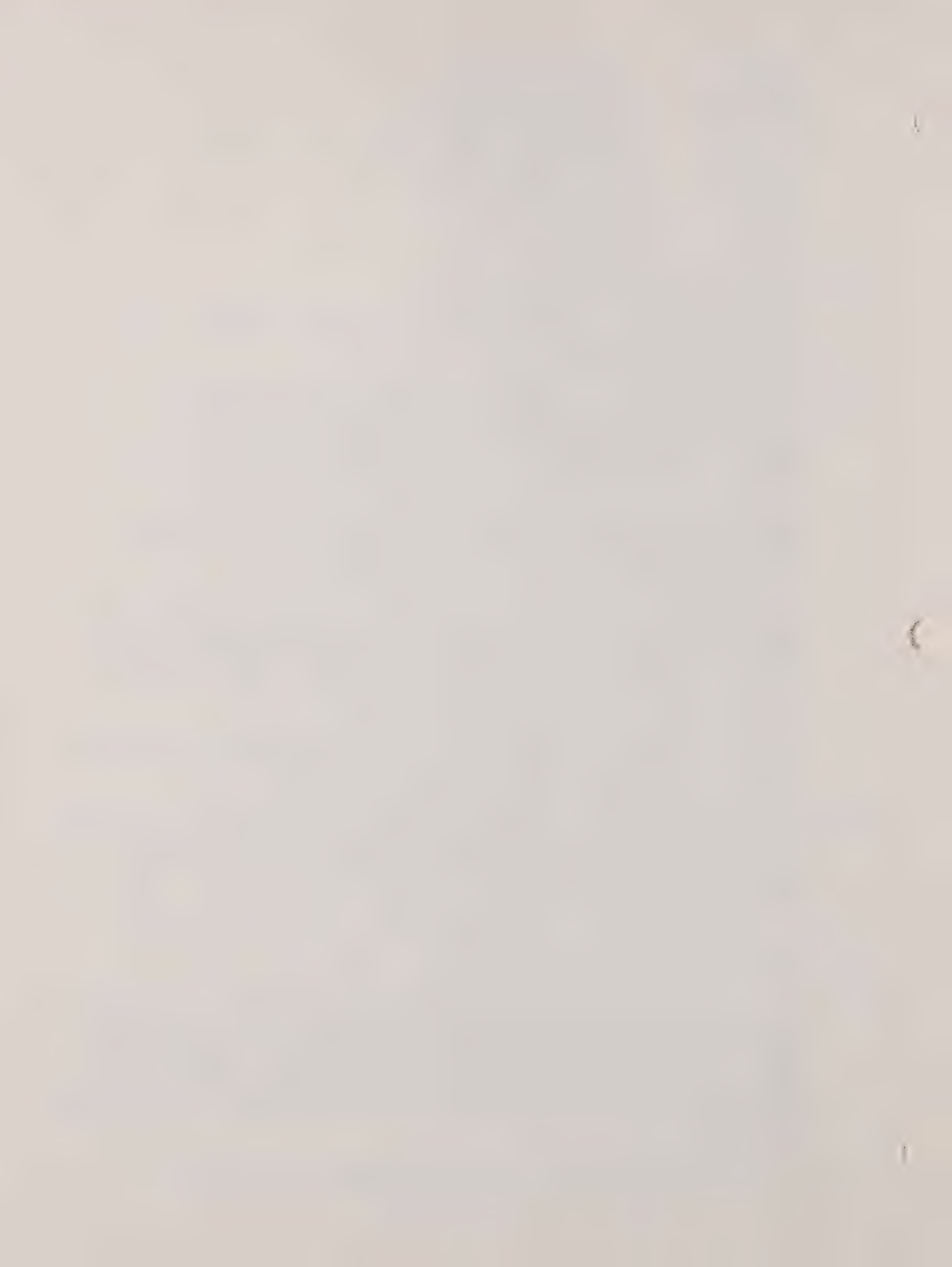
DVKADC LSI-11 Traps Test: This is a test of all operations and instructions that cause traps. Also tested are trap overflow conditions, oddities of register 6, interrupts and reset and wait instructions.

ZKMAF1 11/23 MOS/CORE 0-128K Memory Exerciser: This diagnostic will test 0-128K of MOS or CORE on any PDP 11 family computer. Some tests are worst case for MOS and some for CORE, but all tests are always run. The test occupies less than 2K of memory, so it can be used to test a system with only 4K of memory.

DZKMAE 11/02 MOS/CORE 0-30K Memory Exerciser: This diagnostic is "ZKMAF1" modified for 30K.

DVKAEB 11/02 IBV11-A Diagnostic: This program allows the user to check out the IBV11-A interface option. In order to check out a greater portion of logic on this option a second IBV11-A is needed. When a second board can be obtained the user must inform the diagnostic to exercise the logic on the one IBV11-A that requires a known good module. The signals "SRQ", "ERI", "BIAKI" "DA11" AND "ER11HB" are not tested if a known good module is not used.

VDVCBO 11/23 IBV11-A Diagnostic: the description and explanation for this diagnostic is the same as that of "DVKAEB".



- ZKRJEO RK11 Basic Logic Test: The RK11 logic test consists of a series of tests aimed at checking the basic logic of the RK11 controller. This test is also compatible to the Plessey disk controller.
- ZRKKFO RK11 Basic Logic Test Part II: This logic test checks the hardware that the first test could not. When used in conjunction with a drive it is also capable of detecting faults in the drive.
- ZRKLEO RK11/RK05 Dynamic Test: The RK11/RK05 Dynamic Test aims at:
1. Demonstrating the electromechanical integrity of the drive.
 2. Checking the linear positioner control and speed control.
 3. Verifying the integrity of the read/write logic.
 4. Providing a timer for the seek function.

This test is one level higher than the logic test.

- ZRKHGO RK11/RK05 Performance Exerciser: The RK11/RK05 performance exerciser is a high level exerciser program aimed at simulating a RK11/RK05 system environment and checking for errors that arise in such an environment (interaction, polling, etc). It also provides a means of evaluating a system through error logging and data-transfer logging facilities.

1.6 DESCRIPTION OF 2290 DIAGNOSTIC TESTS

The following are descriptions of the 2290 diagnostics that are run.

- FKAACO 11/34 Basic Instruction Test: This diagnostic program is designed to be a comprehensive check of the 11/34 processor logic and microcode for all instructions except the trap and memory management instructions. The program does not test instructions or hardware related to the trap or interrupt mechanisms of the 11/34 (e.g., RTT, RT1, WAIT, RESET).
- FKABCO 11/34 Traps Test: This is a test of all operations and instructions that cause traps. Also tested are trap overflow conditions, oddities of register 6, interrupts, the reset and wait instructions.
- FKACAO 11/34 Extended Instruction Set Test: this diagnostic program tests the 11/34 extended instruction set <ASH, ASHC, MUL, and DIV>, using registers 0-5 at least once with each instruction.
- ZM9BCO M9312 Boot Board Test: This diagnostic verifies the ROM information for the M9312 bootstrap terminator. It has two modes of operation; stand-alone mode which requires operator intervention and apt mode. (refer to chapter 4)
- CMFAFO MS11.MF11,MA11-P Memory Test: This program locates the parity memory registers for both the core and MOS parity and performs a check of the bits in each. It then creates a map showing the memory controlled by each parity register. The parity registers and the memory are then tested using the information in the map.

FKTHB0 11/34 Memory Management Test: This program tests by the "bottom up" approach starting with the smallest segment of memory management logic possible and building to cover all of the logic. The diagnostic will provide enough information such that by deduction, the failure can be isolated to a small segment of the memory management logic.

ZDLDC0 DL11-W Diagnostic: This diagnostic is a logic test to verify the operation of the DL11-W serial line/real time clock interface. The program will run without any special test fixtures by default.

ZDZAE0 DZ-11 8 Line Async MUX Test: The function of the DZ-11 diagnostic is to verify the board operates according to the specifications and functions in a system environment. First it determines the device address and the vectors to determine if it is EIA or 20MA, and then runs in an echo mode to check the interface. This does not check the device it is connected to(i.e.,VT-100 SELF TEST).

ZQMCFO 0-124K Memory Exerciser 16K Intervals: This program has the ability to test memory from address 000000 to 757777. It does so using:

1. Unique addressing techniques
2. Worse case noise patterns, and
3. Instruction execution throughout memory

ZRKJEO RK11 Basic Logic Test: The RK11 logic test consists of a series of tests aimed at checking the basic logic of the RK11 controller. This test is also compatible to the plessey disk controller.

ZRKKFO RK11 Basic Logic Test Part II: This logic test checks the hardware that the first test could not. When used in conjunction with a drive it is also capable of detecting faults in the drive.

ZRKLE0 RK11/RK05 Dynamic Test: The RK11/RK05 dynamic test aims at:

1. Demonstrating the electromechanical integrity of the drive.
2. Checking the linear positioner control and speed control.
3. Verifying the integrity of the read/write logic.
4. Providing a timer for the seek function.

This test is one level higher than the logic test.

ZRKHFO RK11/RK05 Performance Exerciser: The RK11/RK05 Performance exerciser is a high level exerciser program aimed at simulating a RK11/RK05 system environment and checking for errors that arise in such an environment (interaction, polling, ETC). It also provides a means of evaluating a system through error logging and data-transfer logging facilities.

Diagnostic Program Use—Section 2

2.1 GENERAL.....	2-1
2.2 2270 DIAGNOSTICS.....	2-1
2.3 2290 DIAGNOSTICS.....	2-19

2.1 GENERAL

This section of the diagnostics manual contains: explicit instructions pertaining to the Set-Up, Running, Re-establishment, and in some cases the expected results of the diagnostic programs for the 2270 and 2290.

2.2 2270 DIAGNOSTICS

2.2.1 Set-Up Procedures

Set the CDC 9427H disk (Hawk) drive* to boot from the removable cartridge. Insert the XXDP+ disk in the drive. Turn on the power and boot up the disk. (Be sure S1 on the 4720 host board is in the up position to enable ODT.)

The system should boot up in about 50 seconds and the console device should display:

```
CLEARING MEMORY
GRDKAO XXDP+ DK MONITOR 28K
BOOTED VIA UNIT 0
```

THE FOLLOWING QUESTIONS MAY BE ANSWERED BY DEFAULT SIMPLY BY TYPING <CR>

```
ENTER DATE (DD-MMM-YY) <CR>
```

```
RESTART ADDR:153726
```

```
LSI?      N <CR>
```

The console will then display:

```
GRXXDP, A MODIFIED VERSION OF DEC XXDP+
```

.

(.) indicates system ready to accept diagnostic programs.

For LSI 11/02 perform sections 2.2.2 to 2.2.6.

For LSI 11/23 perform sections 2.2.7 to 2.2.9.

* Control Data Corp., 400 NW 39th St., Oklahoma City, OK 73112.



2.2.2 LSI-11/02 Processor Basic Instruction Test

On the console device, type:

```
R DVKAAA <CR>
```

This starts the diagnostic. After each successful pass of the diagnostic (about 5 seconds per pass), the console device displays:

```
END PASS n
```

Allow a minimum of 2 passes and then depress <ESC> <RESET>. The program will halt and display "@" the ODT prompt.

To re-establish the system for the next program, type:

```
153726G
```

2.2.3 LSI-11/02 EIS Test

On the console device, type:

```
R DVKABA <CR>
```

This starts the diagnostic. After each successful pass of the diagnostic (about 5 seconds per pass), the console device displays:

```
END PASS n
```

Allow a minimum of 2 passes and then depress <ESC> <RESET>. The program will halt and display "@", the ODT prompt.

To re-establish the system for the next program, type:

```
153726G
```

2.2.4 LSI-11/02 FIS Test

On the console device type:

```
R DVKACC <CR> <CR>
```

This starts the diagnostic. After each successful pass of the diagnostic (about 2 seconds per pass), the console device displays:

```
END PASS n
```

Allow a minimum of 2 passes and then depress <ESC> <RESET>. The program will halt and display "@", the ODT prompt.

To re-establish the system for the next program type:

```
153726G
```


2.2.5 LSI-11/02 Traps Test

On the console device type:

R DVKADC <CR>

This starts the diagnostic. After each successful pass of the diagnostic (about 35 seconds per pass), the console displays:

END PASS n

Allow a minimum of 2 passes and then depress <ESC> <RESET>. The program will halt and display "@", the ODT prompt.

To re-establish the system for the next program type:

153726G

2.2.6 LSI-11/02 MOS Memory Test

On the console device type:

R DZKMAE <CR>

This starts the diagnostic. The console device displays:

DZKMA-D
000000-167776

The diagnostic is now running and will test each 4K memory bank from 0-6, and the 2K memory bank 7. After the banks 0-7 have been completed, the console device will display:

TST13 BANK 0X (SEVEN TIMES WITH
X GOING FROM 0 TO 6)

The console device then displays:

RELOC

Bank 00 will be retested as the diagnostic relocates itself. The console device then displays:

END PASS n

(Running time is about 15 minutes.)

Allow a minimum of 2 passes and then depress <ESC> <RESET>. The program will halt and display "@", the ODT prompt.

To re-establish the system for the next program, depress the initialize button and reboot the system.

2.2.7 LSI-11/23 CPU Test

On the console device type:

```
R JKDBB0 <CR>
```

This starts the diagnostic. The console displays:

```
CJKDB-B DCF11-AA CPU DIAG.
```

After each successful pass of the diagnostic (about 15 seconds per pass), the console displays:

```
END PASS      n
```

Allow a minimum of 2 passes and then depress <ESC> <RESET>. The program will halt and display "@", the ODT prompt.

To re-establish the system for the next program, type:

```
153726G
```

2.2.8 LSI-11/23 MMU Test

On the console device, type:

```
R JKDAB0 <CR>
```

The console displays:

```
MD-11-CJKDA-B KTF11-AA MMU DIAG.  
SWR=000000    NEW=  
TYPE <CR>
```

This starts the diagnostic.

The console displays:

END PASS n; total errors since last start at 200 = 0 (about 15 seconds per pass).

Allow a minimum of 2 passes and then depress <ESC> <RESET>. The program will halt and display "@", the ODT prompt.

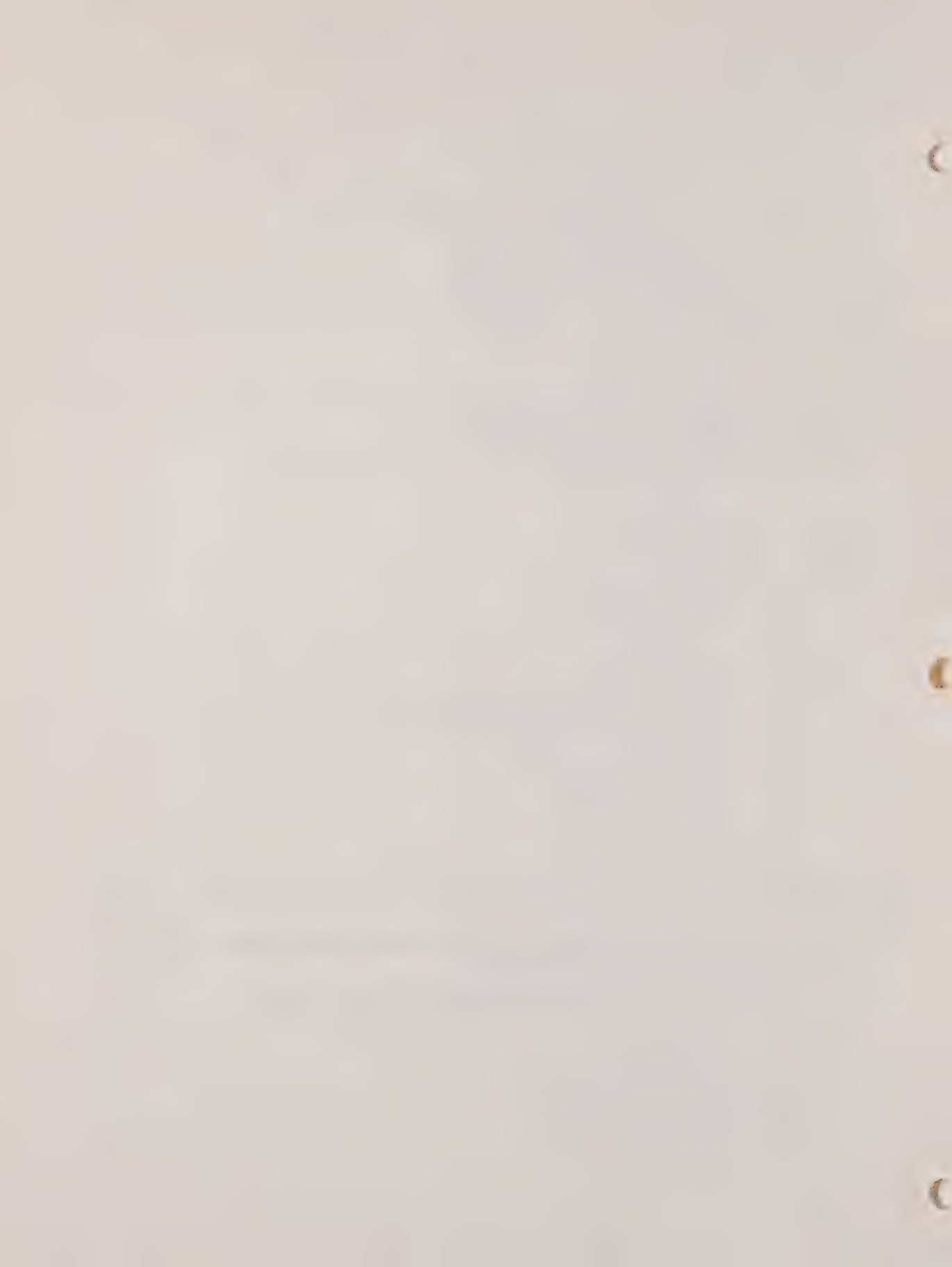
To re-establish the system for the next program, type:

```
153726G
```

2.2.9 LSI-11/23 128K Memory Test

On the console device type:

```
R ZKMAF1 <CR>
```



This starts the diagnostic. The console displays:

CZKMAFO

000000-757776 (Immediately)

TST13 BNK 00 (After several minutes)
TST13 BNK 06

RELOC
TST13 BNK 00 (Delayed sequential display)
TST13 BNK 07

TST13 BNK 30
END PASS 01
(about 34 minutes per pass)

Allow a minimum of 2 passes and then depress <ESC> <RESET>. The program will halt and display "@", the ODT prompt.

To re-establish the system for the next program, depress the initialize button and reboot the system.

2.2.10 LSI-11/23 128K Memory Exerciser

Note

This test will take about 14 hours and 20 minutes to run.

On the console device, type:

L ZKMAF1 <CR>

Then type: <ESC> <RESET>
Then type: 176/
The console device displays:

000 176 010000
Type: 10200 <CR>
Type: 200G

What the console displays now will be similar to that of the previous test.

After one pass is completed, type: <ESC> <RESET> The program will halt and display "@", the ODT prompt.

To re-establish the system for the next program, depress the initialize button and reboot the system.

2.2.11 Display Test

Key in the following command string to load and run the terminal board test:

```
.R ZICDCA <CR>
```

The program will come up with a header page that allows tests to be run separately or sequentially. Hit any key on the GR keyboard to continue.

a. The display should indicate the following:

```
THERE WERE NO REGISTER TIME OUT FAILURES. THE CONSOLE DEVICE PRETESTS  
PASSED. PLEASE TYPE A CHARACTER ON THE KEYBOARD.
```

Type a character on the keyboard. The display should be:

```
PLEASE TYPE ANOTHER CHARACTER ON THE KEYBOARD
```

Type another character on the keyboard. The display should be:

```
THERE WERE NO READ WRITE FAILURES
```

b. After a short delay, the terminal starts displaying a precessing scrolling character set.

Hit the spacebar. The display intensity should increase. Hit the spacebar again and the display should return to normal. Continue pressing the spacebar and note the following sequence: (If all of them do not occur or are in the wrong order, a failure has occurred.)

```
INVERSE VIDEO  
NORMAL  
BLINKING  
NORMAL  
UNDERLINE 8 ON  
UNDERLINE 9 ON  
UNDERLINE BLINK ON  
UNDERLINE 9 OFF  
UNDERLINE BLINK OFF  
UNDERLINE 8 OFF
```

```
DISABLE SCROLL ON (bottom line moving only)
```

Note

At this time, check the characters for proper formation. Hit the space bar again.

```
DISABLE SCROLL OFF  
DOUBLEWIDTH ON  
DOUBLEWIDTH OFF
```

c. After a short delay, the screen will contain all X's. Verify that an X is in each location by counting 24 lines. In this section repeatedly press the spacebar and note that all the X's have the same attributes. If some

locations do not have the same attributes, a failure has most probably occurred in the attribute RAM. You should see the following sequence of displays:

INTENSE VIDEO
NORMAL
INVERSE VIDEO
NORMAL
BLINKING
- NORMAL
UNDERLINE 8 ON (ONE RASTER LINE ABOVE THE BOTTOM OF CURSOR)
UNDERLINE 9 ON (SAME RASTER LINE AS THE BOTTOM OF CURSOR)
UNDERLINE BLINK ON
UNDERLINE 9 OFF
UNDERLINE BLINK OFF
BLANK SCREEN (CURSOR ONLY)
ROW OF X'S (AT THE BOTTOM OF THE SCREEN)
NORMAL (FULL SCREEN OF X'S)
DOUBLEWIDTH ON
NORMAL

Press the spacebar again for the next section.

d. Keyboard Test

The display prints:

PLEASE KEY IN A "SHIFT A"

The display prints the character received and then prints:

PLEASE KEY IN A "SHIFT B"

The display prints the character received and then prints:

PLEASE KEY IN A "SHIFT D"

The display prints the character received and then prints:

PLEASE KEY IN A "SHIFT H"

The display prints the character received and then prints:

PLEASE KEY IN A "SHIFT P"

The display prints the character received and then prints:

PLEASE HIT THE SPACEBAR

The display prints the character received and then prints:

PLEASE KEY IN A "="

Note

You will not see a space!

If the test is successful, the display then moves onto the next section and graphically displays 2 keypads.

e. Keypad Test

The display should be displaying a left and right keypad. Insert a keypad cable into the left keypad connector on the 2270.

- Press the start/continue button on the keypad. The displayed keypad will blink the start/continue location and the fail light will turn inverse video indicating that the keypad fail LED should be on. Press the start/continue button several times and make sure that the keypad LEDs are in phase with those on the display.

Now press the other keypad keys in sequence and make sure that the corresponding displayed keypad switches blink in turn.

Move the keypad to the righthand keypad connector on the 2270 and repeat the above test making sure that the righthand keypad display is activated.

Type a <CTRL>-C to terminate this test.

f. PROCESSOR HALT TEST

The monitor should now display:

```
CONSOLE DEVICE TEST COMPLETE
PLEASE ENTER ONE OF THE FOLLOWING:
CONTROL-Z --TO RESTART TEST PROGRAM
CONTROL-C --TO ENTER THE MANUAL MODE
CONTROL-X --TO EXIT THE PROGRAM
```

Type <CTRL>-C. This will put you in the manual mode and its display page. Make sure that S1 on the host board (2266-4720) is in the up position. Hit the ESC key on the GR keyboard. The screen will be replotted. Now hit the reset key on the GR keyboard. You will now see:

```
XXXXXX      (Some number between 44344 and 44352)
@
```

Now type P <CR>. The display will again be replotted. This indicates that the processor halt function is working properly. Now type <CTRL>-C.

This completes this test at this time. Type: <CTRL>- X and the system will reboot.

2.2.12 LSI-11/02-11/23 IEEE488 Option Test

On the console device type:

```
R DVKIBC <CR>
```

After the first successful pass (about 5 seconds), the console displays:

```
END PASS 1.
```


The diagnostic is now looping 2000 times. After 30 seconds, the console displays:

END PASS 2

Allow a minimum of 2 loop passes. Then depress <ESC> <RESET>. The program will halt and display "@", the ODT prompt.

- To re-establish the system for the next program type:

153726G

2.2.13 CDC "Hawk" Disk Drive and Dynus Controller Test

Note

This test should be run only after the drive head alignment check and index-to-burst adjustment have been completed.

Note

All information on DK1:, 2, or 3 will be destroyed on execution of this test.

On the console device type:

C RKTEST

Note

If the system contains an LSI-11/23 with 128K of memory, the following error message will be displayed during RK11 Logic Test 2:

```
'ERR BIT' DIDN'T SET IN RKER
PC      RKCS      RKER  ERR BIT
015676 100266  000001  002000
```

```
HE OR  ERR DIDN'T SET
PC      RKCS      RKER
015712   100266  000001
```

If this error is obtained, ignore it! The reason this test fails is that the diagnostic is checking the controller's ability to detect nonexistent memory; however, memory exists everywhere.

As the 4 disk/controller diagnostics run, the diagnostic type-out occurs as follows:

R ZRKJE0/2

RK11 LOGIC TEST 1 (Run time is one minute per pass.)
MAINDEC-11-DZRKJ-E

END PASS

R ZRKKF0/1

RK11 LOGIC TEST 2 (Run time is 6 to 10 minutes per pass.)
MAINDEC-11-CZRKKF

NOT TESTING DRIVE 0
DRIVES PRESENT
000000
000001
000002
000003
DRIVE 1

DRIVE 2

DRIVE 3

END PASS 1

R ZRKLE0/1

RK11 DYNAMIC TEST (Run time is 15 to 20 minutes per pass.)
MAINDEC-11-DZRKL-E

NOT TESTING DRIVE 0
DRIVES PRESENT
1
2
3
DRIVE 1
DRIVE 2
DRIVE 3

END PASS 1

R ZRKHG0/1

RK11/RK05 PERFORMANCE EXERCISER (Run time is 30 to 90 minutes per
pass.)
MAINDEC-11-DZRKH-G

NOT TESTING DRIVE 0
DRIVE, IF, 2F, 3F

END OF PASS 1

DRIVE:	WRDS WRITN	WRDS READ	CSE	SCE	DATERR	HE	SKE	ABORT	SIN
1	18555	17033	0	0	0	0	0	0	0
2	38990	37451	0	0	0	0	0	0	0
3	15552	14564	0	0	0	0	0	0	0

The following columns should all be zeroes: CSE,SCE,DATERR,HE,SKE, ABORT,SIN. If the columns are not all zeroes, the drive or the controller is bad.

THE RKTEST PROGRAM WILL RESPOND WITH A DOT (.) WHEN COMPLETED.

2.2.14 Data Reliability and Drive Integrity

Note

Running this test will destroy all information on all disk surfaces.

On the console device type:

L ZRKHGO <CR>

Spin down the XXDP+ disk and remove it. Let out the write-protect switches.

Get a scratch disk that has been formatted in a known-good drive. Spin it up in your drive.

Clear memory location 40 by the following method:

Type <ESC> <RESET>.

The LSI-11 will go into console ODT mode. Console ODT will respond:

```
XXXXXX
@
```

where the X's stand for octal digits.

Now type:

40/

and console ODT will put six more octal digits on the screen, representing the contents of location 40. Type:

O<CR>

to clear location 40. Console ODT will respond with a carriage return, line feed, and another @ symbol.

Now type:

200G

to start the program. The program will output

SWR = 000000 NEW =

and-wait. Type <CR> to make the program continue.

Let the drive run for 12 hours. Then check that the status report on the screen shows all zeroes in the following columns:

CSE, SCE, DATERR, HE, SKE, ABORT, SIN.

If the columns are not all zeroes, the drive or the controller is bad.

2.2.15 LSI-11/02 QAFC Test

On the console device type:

R ZPQAOC [JPQACB FOR 11/23]

The console will display several questions to be answered by the user. Responses are made by typing Y (yes) or N (no) followed by <CR>.

After completion of test, depress <ESC> <RESET>. The program will halt and display "@" the ODT prompt.

To re-establish the system for the next program type:

153726G

2.2.16 Strip Printer Interface Test

Check the following before proceeding with the test:

- . that the jumper (J1) is installed in the (4709) board in slot 1 of of the I/O cage,
- . that the strip printer has paper loaded, and
- . that the strip printer power and select switches are in the "on" position.

Turn system power on and boot the diagnostic disk.

Load the strip printer test program by typing the following on the console device:

R ZISPOA <CR> for 11/02

R JISPCA <CR> for 11/23

The program should begin execution automatically and halt after one complete pass. The strip printer will print messages indicating what functions it will be performing.

To repeat the test depress any key on the console keyboard except <CNTRL> C to cause the system to halt in the console ODT mode.

After completion of the test, run down the disk drive and turn off the system power.

2.2.17 Clock Timer Board Test

a. With the system powered down, install the clock board on an extender board.

b. Check that the battery voltage is at least 3.0 V and that there are no signs of leakage or corrosion.

c. Check that a wire-wrap jumper is installed between TP "clock" and TP "64".

d. Check that jumper J5 has been installed.

e. Remove the fuse from FIX and install it in F1.

f. Power up the system and boot the diagnostic disk.

g. Put the write/protect switch on the clock board to the write position.

h. Load the clock test program by typing the following on the console keyboard:

R ZIRTCC <CR> FOR 11/02

R JIRTCC <CR> FOR 11/23

i. If the program runs successfully (note 1) connect a counter between U17-Pin 5 and ground. Tweak C2 for a reading within the limits shown below, (note 2).

	<u>PERIOD</u>	<u>FREQUENCY</u>
MAX	30.516434 us	32,767.298 Hz
NOM	30.517578 us	32,768 Hz
MIN	30.518723 us	32,768.702 Hz

NOTE 1. If test fails, particularly at Test 26, check that write/protect switch is in the write position and that S1 on all Kramden boards are in the normal position.

NOTE 2. Higher accuracy can be achieved by measuring the period rather than the frequency.

j. Run down the diagnostic disk and turn off the system power. Install the clock board in the system and return power.

2.2.18 Relay Ground Driver Test

a. Load the diagnostic disk and start the program by typing the following on the console keyboard:

- R ZMRGCB <CR> FOR 11/02

R JMRGCA <CR> FOR 11/23

The program will begin. At this time the user can observe the LEDs on the relay ground board (under the receiver) blinking at a 1 Hz rate, and hearing the relays turn on and off.

b. To terminate the test type <ESC> <RESET>.

c. To re-establish the system for the next program type:

153726G

2.2.19 Measurement Module Tests

To calibrate and verify the following measurement modules refer to the "MIN CAL" portion of this manual.

AC IMPEDANCE MEASUREMENT MODULE

ZMACRG.BIN

This program calibrates (limited) and verifies accuracy of ACZ (4708) for both (11/02) and (11/23).

DC SOURCE MODULE

ZMDSRG.BIN

This program calibrates and verifies accuracy of DC source (4711) for both (11/02) and (11/23).

DC MEASUREMENT MODULE

ZMDMRG.BIN

This program calibrates and verifies accuracy of DC measure (4712) for both (11/02) and (11/23).

The remaining modules in the measure and scanner cages are tested and verified at this level by using the existing programs on the system OVP disk.

<u>MODULE</u>	<u>LOCATION</u>	<u>TEST METHOD</u>
MUX	M 32(MAN) 31(OPT) 30(OPT)	With known good board in slot 32 and board to be tested in slot 31, run OVP MUX (n)10 [N = version available reply option 1 to display.
RELAY DRIVER	M 2 M 3	With known good board in slot 2 and the board to be tested in slot 3, run OVP PIO(n)10 [N = version available].
SCANNER	SCN 1-X	Run OVP SCN RLY(n)10 [N = version available].

2.2.20 Driver/Sensor Reference Calibration and Verification

ZDRFRG.BIN

This program calibrates and verifies the accuracy of the D/S Reference Board (4705) for both (11/02) and (11/23) and all digital configurations.

For further instructions concerning this program, refer to the "MIN CAL" portion of this manual.

2.2.21 Driver/Sensor Controller Board Test

- a. Install the D/S controller board in its assigned slot.

Note

The D/S controller board is always installed in the lower cage except for system configuration 7.8 (big digital with pure pins).

- b. Install the known good D/S board in the first available D/S slot.
- c. Install the 2270-XXDP+ disk into the disk drive.
- d. Turn the 2270 system power on, then spin-up the disk drive to boot to the XXDP+ monitor.
- e. Key in the following command string (after the period) to load and run the D/S controller test program.

.R ZDCTOC <CR> FOR 11/02

.R JDCTCA <CR> FOR 11/23

The selected display terminal should respond with the following message:

D/S CONTROLLER BOARD DIAGNOSTIC

KEYBOARD CONTROLS WHICH ARE OPERATIONAL:

<CTRL> C - ABORTS TASK AND RETURNS TO MONITOR
<CTRL> O - ABORTS TASK AND EXITS TO ODT
<CTRL> Z - RESTARTS PROGRAM
<CTRL> S - TEMPORARILY HALTS PROGRAM EXECUTION
<CTRL> Q - RESUMES EXECUTION AFTER <CTRL>S

CAP G - TURN ON/OFF DISPLAY FOR PRINTING
CAP L - TURN ON/OFF LINE PRINTER FOR PRINTING
CAP S - TURN ON/OFF STRIP PRINTER FOR PRINTING
DEFAULT FOR PRINTING G - ON, L - OFF, S - OFF
ALL OTHER KEYCODES IGNORED. HH:MM:SS

ENTER SLOT NUMBER OF THE FIRST D/S BOARD TO BE TESTED:

f. Enter the board number of the known good D/S board (normally 1). Type a carriage return. The program will respond with the next request:

ENTER SLOT NUMBER OF THE LAST D/S BOARD TO BE TESTED:

g. After entering the board number of the known good D/S board followed by a <CR>, the program begins execution automatically and continues looping indefinitely. An "end of pass" message is printed indicating the pass count and system time:

D/S TEST - END OF PASS XX HH:MM:SS

- h. Allow program to run several passes before discontinuing.
- i. When complete, spin down disk and turn system power off.
- j. Remove the known good D/S board from the system.

2.2.22 Slave Controller Board Test (2266-4719)

- a. Install the slave controller board in its assigned slot.

Note

Do not proceed until the successful completion of the main D/S controller board.

- b. Install the known good D/S board in the first available D/S slot in the D/S cage (board slot 31 is the normal slot).

- c. Install the 2270 XXDP+ disk in the disk drive.

- d. Turn the 2270 system power on, then spin-up the disk drive to boot to the XXDP+ monitor.

e. Type in the following command string (after the period) to load and run the slave controller test program:

R ZDCTOC <CR> FOR 11/02

R JDCTCA <CR> FOR 11/23

The selected display terminal should respond with the following message:

D/S CONTROLLER BOARD DIAGNOSTIC

KEYBOARD CONTROLS WHICH ARE OPERATIONAL:

<CTRL> C - ABORTS TASK AND RETURNS TO MONITOR

<CTRL> O - ABORTS TASK AND EXITS TO ODT

<CTRL> Z - RESTARTS PROGRAM

<CTRL> S - TEMPORARILY HALTS PROGRAM EXECUTION

<CTRL> Q - RESUMES EXECUTION AFTER <CTRL> S

CAP G - TURN ON/OFF DISPLAY FOR PRINTING

CAP L - TURN ON/OFF LINE PRINTER FOR PRINTING

CAP S - TURN ON/OFF STRIP PRINTER FOR PRINTING

DEFAULT FOR PRINTING G - ON, L - OFF, S - OFF

ALL OTHER KEYCODES IGNORED. HH:MM:SS

ENTER SLOT NUMBER OF THE FIRST D/S BOARD TO BE TESTED:

f. Enter the board number of the known good D/S board (normally 31), and then a carriage return (<CR>). The program will respond with the following statement:

ENTER SLOT NUMBER OF LAST D/S BOARD TO BE TESTED:

g. After entering the board number of the known good board, the program begins execution automatically and continues looping indefinitely. An "end of pass" message is printed indicating the pass count and system time:

D/S TEST - END OF PASS XX HH:MM:SS

h. Allow program to run several passes before discontinuing.

i. When complete, spin down disk and turn system power off.

j. Remove the known good D/S board from the system, and proceed with the next section.

2.2.23 Driver/Sensor Board Test (2266-4706)

a. Install no more than 5 D/S boards (2266-4706) in the first D/S slots.

b. Install the 2270 XXDP+ disk in the disk drive.

c. Turn the 2270 system power on, then spin-up the disk drive to boot to the XXDP+ monitor.

d. Type in the following command string (after the period) to load and run the D/S diagnostic test program.

.R ZDDSOJ <CR> FOR 11/02

.R JDDSCA <CR> FOR 11/23

- The selected display terminal should respond with the following message:

D/S SYSTEM DIAGNOSTIC

KEYBOARD CONTROLS WHICH ARE OPERATIONAL:

<CTRL> C - ABORTS TASK AND RETURNS TO MONITOR

<CTRL> O - ABORTS TASK AND EXITS TO ODT

<CTRL> Z - RESTARTS PROGRAM

<CTRL> S - TEMPORARILY HALTS PROGRAM EXECUTION

<CTRL> Q - RESUMES EXECUTION AFTER <CTRL> S

CAP G - TURN ON/OFF DISPLAY FOR PRINTING

CAP L - TURN ON/OFF LINE PRINTER FOR PRINTING

CAP S - TURN ON/OFF STRIP PRINTER FOR PRINTING

DEFAULT FOR PRINTING G - ON, L - OFF, S - OFF

ALL OTHER KEYCODES IGNORED. HH:MM:SS

ENTER SLOT NUMBER OF FIRST D/S BOARD TO BE TESTED :

e. Enter the decimal slot number of the first D/S board to be tested. In a pure pin system, the number is typically one more than the number of analog slots in the system. In a hybrid pin system, this number should be one.

The program will print out the following message:

ENTER SLOT NUMBER OF THE LAST D/S BOARD TO BE TESTED:

f. Enter the decimal slot number of the last D/S board to be tested.

Note that there can not be any physical or electrical gap between the first and last entries. However, any single or group of D/S boards can be tested by simply entering the appropriate numbers.

Note

The program validates your entries and proceed automatically with diagnostic test execution. If the entries are found to be invalid, an error message is displayed, indicating the first and last board recognized by the program. You will be asked to re-enter numbers for the first and last board.

Once started, the program continuously cycle through all the diagnostic tests. At the end of each pass, and "end of pass" message is displayed indicating the pass count and system time.

This program, at present, does not allow the benefit of manual troubleshooting. Do not attempt to clear all error messages at this time. Attempts should be made to clear only those errors that disable the the board and/or D/S system.

g. Allow program to run for several passes before continuing.

h. Stop test program execution by typing <CTRL> C, then spin-down disk and turn 2270 system power off.

i. Install the remaining D/S boards for the first cage only and repeat test. Continue below.

j. If the system is a BIG D, install all of the remaining boards and repeat test.

This completes the first phase of D/S checkout.

2.3 2290 DIAGNOSTICS

2.3.1 Set-Up Procedures

A 2290 console device may be a DECWRITER or a VT100, depending on the individual system configuration.

a. Insert the XXDP+ disk in the lower drive.

b. Turn on the power and depress the boot button.

The DECWRITER will respond with the contents of the CPU registers:

XXXXXX XXXXXX XXXXXX XXXXXX

@

c. Respond by typing on the console device:

DK2 <CR>

d. The console device replies with:

Clearing memory GRDKAO XXDP+ DK monitor 28K booted via unit 2.

e. The following questions may be answered followed by <CR>:

The console device will respond with:

GRXXDP, a modified version of DEC XXDP+

(.) indicates system ready to accept diagnostic programs.

2.3.2 Verification

This program, in chain file form, verifies the processor and most of the options in the 2290.

a. Type on the console device:

```
C USERCK <CR>
```

The console device will respond with:

```
L FKAACO
```

b. To continue, press <CTRL> and <CONT> keys simultaneously:

```
S 176/5
```

c. At this time, depress the <CTRL> and <CONT> keys simultaneously on the control panel of the 11/34. The following is displayed:

```
R FKABCO/5  
R FKACAO/5  
R ZM9BCO/3  
R CMFAFO/3  
R FKTHBO/3  
R ZDLDCO/3  
R ZDZAE0/3
```

The chain program executes at this time printing the results as it progresses, terminating with:

```
"END"
```

Any of these programs may be run individually, according to the users diagnostic needs, as correlated with the programs description by typing:

```
R filename <CR>
```

2.3.3 11/34 0-124K Memory Exerciser (Optional)

a. If further memory diagnosis is needed, type the following on the console device:

```
R ZQMCFO <CR>
```

The program begins (approx. 3 min/16K memory). Upon completion, the console device responds with:

```
END PASS n
```


b. Allow time for a minimum of two passes. Then simultaneously depress the <CTRL> and <HALT> keys on the PDP 11/34 control panel.

c. To re-establish the system for the next program, enter 153726 and press LAD on the PDP 11/34 control panel. Simultaneously depress <CTRL> and <START> keys.

2.3.4 LA 36 Decwriter Test (Optional)

This test exercises the DECWRITER.

a. Type the following on the console device:

R ZLACFO <CR>

The program executes and proceeds to print out a series of 12 tests numbered in octal (approx 6 mins.).

b. Allow time for two complete passes, then simultaneously depress the <CTRL> and <HALT> keys on the PDP 11/34 control panel.

c. To re-establish the system for the next program on the PDP 11/34 control panel, enter 153726 and depress LAD key; then simultaneously depress <CTRL> and <START>.

2.3.5 Line Printer Test (Optional)

This test exercises the Printronix line printer.

Type:

R ZLPAB1 <CR>

This executes the test, and the system responds with questions and instructions to the user. The program concludes by typing on the console device:

"END"

2.3.6 Disk Drive and Controller Test

When the program arrives at this point, the following is displayed:

WARNING - RUNNING THIS TEST WILL DESTROY ALL
INFORMATION ON ALL SYSTEM DISK
SURFACES EXCEPT THE DIAGNOSTIC SURFACE

a. When this test is to be used, type on the console device:

C DISKCK <CR>

The console device responds with:

L ZRKJEO

b. To continue, press <CTRL> and <CONT> keys simultaneously.

S 176/2

c. At this time, depress the <CTRL> and <CONT> keys on the PDP 11/34 control panel simultaneously.

R ZRKKF0/2

R ZRKLE0/2

R ZRKHGO/2

The chain program will execute at this time printing the results as it progresses, terminating with:

"END"

.

This concludes the 2290 Diagnostics.

For further information pertaining to the 2290 diagnostics, refer to 2290-0108 and 2290-0109 manuals received with the system package.

Appendix A

A.1	Hard Copy Directory (2270).....	A-1
A.2	Hard Copy Directory (2290).....	A-1
A.3	Help Text (2270).....	A-1
A.4	Disk Pack Formatter and Surface Verifier (2270)...	A-1
A.5	Manual Disk Boot (2270).....	A-3
A.6	Manual Disk Boot From Any Drive.....	A-3
A.7	Manual Floppy Diskette Boot (2270).....	A-4
A.8	XXDP+ Monitor.....	A-5
A.9	Chain Mode Operation.....	A-5
A.10	Floppy Drive System Test.....	A-11
A.11	DSD Floppy Disk Drive Diagnostic Procedure.....	A-12
A.12	Additional Information.....	A-14

A.1 DIRECTORY HARD COPY (2270)

After booting the XXDP+ disk and console displays (.), type P/n,

where n = 0 standard Dec device
1 strip printer 11/02
2 line printer 11/02
3 strip printer 11/23
4 line printer 11/23

The console again displays (.). Type D/L and the directory will be hard copied to the chosen device.

A.2 DIRECTORY HARD COPY (2290)

After booting the XXDP+ disk, the console device prints (.). Type DIR DK0;<CR>. The directory outputs to the DECWRITER LA-36.

A.3 HELP TEXT HARD COPY (2270)

After booting the XXDP+ disk and performing the P/n operation, type R UPD2. The console displays (*). Type: Print DK0: HELP.TXT <CR>. The help file is printed on the chosen device.

A.4 DISK PACK FORMATTER AND SURFACE VERIFIER.

The 5440 media disk pack as it is received from stock may not be formatted. To format the disk and verify that there are no bad blocks, an RK11 utility program is run under XXDP+ UPDATE 2.

- a. Install a XXDP+ Disk on a 2270 system and boot the system.
- b. Write protect the fixed disk, if formatting the removable cartridge media.
- c. Write protect the cartridge, if formatting the fixed media.
- d. Enter the Update 2 program as follows:

R UPD2 <CR>

- e. Load the RK11 utilities program as follows:

Load DK0:ZRKIFO.BIN <CR>

- f. If the removable cartridge disk is being formatted, spin down the disk and install the disk to be formatted.

- g. Start the RK11 utility program as follows:

Start 200 <CR>

XXXXX = 00001

- h. The program will display:

SWR = 000000 NEW =

- i. Hit carriage return <CR>.

The utility program will display a list of the options available.

- j. Select type 3, "FORMATTER SURFACE VERIFIER"

The program will then display:

SWR = 000000 NEW =

The number entered here tells the program which drives to format.

DRIVE	SWR
0	1
1	2
2	4
3	10
0 + 1	3
2 + 3	14 ✓
0,1,2+3	17

logical DK2: DK3:

- k. If the 2270 system is configured for logical drives 0 and 1 to be on the top removable media, enter:

NEW = 3

The program will start with drive 0 and format that drive first. If there are no errors, it will display:

PACK GOOD

and continue to drive 1.

If drive 1 is also good, the disk pack has been formatted and verified.

1. To get out of the program, press initialize.

A.5 MANUAL DISK BOOT

If for any reason it is necessary to boot the system disk from the console device, the following methods can be used:

a. Boot to drive 0.

b. Enter the following code at the console terminal. (Be sure the disk drive is on and spun up to "READY".)

```
10000/12737
10002/    5
10004/177404
10006/    1
10000G
```

c. Halt the CPU by depressing the <ESC> <RESET> keys.

Type in:

OG

The system should boot to logical drive 0.

A.6 MANUAL DISK BOOT TO ANY DRIVE.

Use this program to boot an operating system on any drive when the system does not have a boot board or contains a defective boot board.

R0 = drive number in bits 15, 14, and 13.

R0	DRIVE
00000	0
20000	1
40000	2
60000	3

Enter the following program at the console terminal:


```

1000/12701  START:  ;MOV RKCS TO R1
1002/177404
1004/      5          ;RESET
1006/10061
1010/      6
1012/12761          ;LOAD RKWC = -256
1014/177400
1016/      2
1020/12711          ;LOAD RED AND GO
1022/      5
1024/105711  1$      ;TEST READY
1026/100376          ;WAIT FOR READY
1030/5007          ;FORCE PC TO 0.
1000G

```

A.7 MANUAL FLOPPY DISKETTE BOOT (2270)

If for any reason it is necessary to boot a 2270 from a floppy diskette, the following method may be used:

a. Place the floppy diskette in DY0.

b. Power up the system.

c. Press the <ESC> and <RESET> keys. The console will display "@", the ODT prompt.

d. Type in the following ODT program:

2000/012701	2064/001776
177170	100422
012700	012711
100240	000403
005002	030011
012705	001776
000200	100415
012704	010513
000401	030011
012703	001776
177172	100411
030011	010213
001776	060502
100440	060502
012711	122424
000407	120427
030011	000007
001776	003737
100433	005000
110413	005007
000304	000000 <CR>
030011	2000 G
001776	
110413	
000304	
030011	

A.8 XXDP+ MONITOR

The XXDP+ monitor is loaded when the system is booted from a XXDP+ disk.

Loading and running programs.

a. Type "R" and the program name (up to 6 characters). Do not type the extension (.BIN, .BIC). This will load and run the program. To just load the program type "L" and the program name. Once loaded typing a "S" will start the program.

b. If a typing error is made type a "CTRL C" key and a (.) will be typed. Retype "R" and the program name.

c. The desired program is loaded a dot typed, and

1. The program self starts if it is self starting, or
2. The program is started at location 20 if the program name was ended with an altmode character, or
3. The monitor waits for another command. The program must be started manually by typing "S program name <CR>".

d. To load another program after running the previously loaded program restart the monitor at the restart address.

A.9 CHAIN MODE OPERATION

Chain mode operation consists of the sequential execution of programs without operator intervention. Only programs that have been modified to run in chain mode can be chained. Chainable programs are identified in the directory by the extensions ".BIC". .BIC is a chainable binary file.

To run chain mode, the XXDP+ monitor requires a file indicating the programs to run and the number of passes each program should run.

A chain file may be generated by using the XTECO editor, and the user must put a .CCC extension on the chain file.

To summarize:

- a. Chain mode runs chainable programs only (.BIC extensions).
- b. A chain file indicates the programs to run and their pass counts.
- c. Only programs located on the same media drive (logical drive) can be chained.
- d. The chain file must be on the same medium with a .CCC extension.

NOTE

When loading diagnostics that check the XXDP+ medium, be sure that the medium is not accidentally destroyed. The removable media should always be write-protected.

e. Enter chain mode by typing:

C filename<CR> (While in monitor mode).

Where:

C is the chain command, and filename is the value of the ASCII file that contains the monitor commands to be executed. The file must have a .CCC extension.

R UPD2 <CR> Load Update 2 program (the . indicates that the XXDP+ monitor is active and ready to accept commands.)

DZQUA-I-RKDP Update Program 2 21-JUL-1976

Program relocated to: XXXXXX Restart address
Restart: XXXXXX

* Ready for keyboard commands.

*Fill <CR> The filler count should be set to 1 for TTY.
000014

*CLR <CR> Clears all memory area to zero below update prog.

*Load dev: filnam.ext To load a program which is in ABS format

XFRADR: 000050 CORE: 000000, 017670

XFRADR: indicates the starting address of the program loaded. If it is 1 or ODD, the program is not self starting.

CORE: Left number = the lowest location.

RIGHT NUMBER = the highest location of the program loaded.

DEV: = KB: = TTY keyboard or low speed tape reader

= PT: = TTY printer and punch

= DKN: = RK11 disk N = 0-3

*Dump DKN: FILE.BIN

The memory contents can be written to a XXDP+ to a XXDP+ medium in ABS format by the dump program. Processing starts from the programs LO core limit and proceeds to but does not include the programs HI core limit.

*XFR <CR>

Request current transfer address. 1 is the current XFR address. New XFR address is entered by the user.

Once a program has been loaded into core by the "LOAD" command it can be made self starting or not self starting. If it is a 1 or ODD it is not self starting.

Diagnostic programs are purposely made not self starting.

*START <CR>

Used to start a self starting program.

*START ADR <CR>

Used to start a program at a specific location.

Note

If the Command Start <CR> is given for a non self-start program, the processor will trap out without an error message.

*SAV RKN: RKDP.SAV

The contents of core are written onto the output device as a single block of data. Starting at location 0 and proceeding to the high limit of the program in core. The only valid extension is .SAV. (core image).

The only current use of the save command is to place a core image of the XXDP+ monitor on disk.

*GET DK0:RKDP.SAV

The "GET" command placed the saved program into core starting at location 0.

Save (.SAV) core image files are no longer in use. The "GET" command is no longer very useful. It has been left as the complement of the save command.

*MOD 50 <CR>
000050 000005 <CR>

Modify address 50. Contents of addr 50 is 5. Type in new contents and <CR> to close address or <LF> to open address +2 for another modification.

The "MOD" command will not allow the user to go beyond the programs protective limits (LO CORE, HI CORE). An "INVCOR" error will occur.

*MODALL 177400
177400 000010

Same as "MOD" command but allows modification of any location.

*CORE <CR>
000000, 014776

The "CORE" command causes the lower and upper limits of the program in core to be typed.

*LOCORE ADR <CR>

The "LOCORE" command is used to change the lower limit of the program in core. ADR is the new LO CORE limit. It is recommended that address be even.

*HICORE ADR <CR>

The "HICORE" command is used to change the upper limit of the program in core. ADR is the new HICORE limit which must be >LOCORE AND < the start of update program.

Typically the "HICORE" command is used to reserve an area for patching a program. The HICORE limit must be set sufficiently high so as to include the complete patch.

*DIR DK0:

This gives an entire directory of DK0:

DIR DK0:.BIN

Gives a directory of all files with an extension of .BIN.

*DIR DK0:*BI?

Gives a directory of all files with an extension of "BI" and any other character.

*DIR DK0:ZTC???.BI?

Gives a directory of all files all with the first three characters of the filename "ZTC" and having an extension beginning with "BI"

*DEL DK0:FILE.EX

Causes the file to be deleted.

*ZERO DK0:

Destroys the directory. This should be done on a brand new disk.

When the device being zeroed contains a "BAD SECTOR" track one of the following messages will be output.

NBBKS -Disk zeroed contains no
 detected bad blocks as
 per bad sector track.

BBKS -Disk zeroed contains
 detected bad blocks as
 per bad sector track.

*BOOT DK0: <CR>

Causes block 0 of DK0 to be loaded into memory, starting at location 0. Block 0 is assumed to have a boot loader.

*SAVM DK0:

Causes the first 4K to be written in .SAV format (core image). This command is used to write the XXDP+ monitor on the device as a core image that is bootable.

SAVM is not a directory entry. It will not show on directory.

*REN DKO:NEWNAME.EX DKO:OLDNAME.EX

Renames the old file. The devices must be the same.

*PIP DEV1:FILENAME.EX = DEVZ:FILENAME.EX

PIP is used to copy a linked file from any device that can input to any device that can output. File data is not checked for format or checksums. (See note below.)

The output file is given today's date.

The user should make sure that the output filename doesn't exist already on the output device directory.

Note

A program that has been "PIPed" to an XXDP+ device should be loaded immediately via the Load command to ensure that no errors have occurred during the PIP command.

*TEXT DKO:FILENAME.EX

Update 2 includes the facility to execute a sequence of commands contained in an ASCII text file. This ASCII text file is created via the text command.

The named file is open for output and quotation marks (") are printed to indicate readiness to accept text. Each line of input is terminated by a carriage return. After the last line has been entered, the file is closed with a control Z.

Control C will abort text mode, returning to command mode and closing the output file.

The ; is used to start a comment which is to be printed during command file execution.

The \$ is used to start a comment which is to be printed and followed by a halt during command file execution (such as "\$PRESS P WHEN READY.")

*TYPE DKO:FILE.TXT

The type command outputs a file to the console device. The type command will accept * and wild character (?) construction in filenames, so that multiple text files can be printed with one command.

*DO DK0:FILENAME.EX

The DO command is used to cause the execution of a command file. The file is executed line by line, and must be terminated with a control Z executable files are created via the "TEXT" command, or via the XTECO text editor.

*FILCMP DK0:=DK1:FILE.EX

The file compare command is used to compare two files which are on different mediums. It can utilize the asterisk and wild character constructions.

*FILE DK2:=DK0:FILNAM.EX

Similar to the PIP command except that it can utilize the "WILD CHARACTER" and "ASTERISK" constructions.

If a file of the same name exists on the output device it will delete the old file.

*FILED DK0:FILNAM.EX

Deletes the file named from the device directory.

DEL DK0:.BIN

Deletes all files on DK0 with a .BIN extension.

CAUTION

UPD 2 does not require verification of a mass deletion command.

Typing a <CTRL> C aborts the deletion at the earliest opportunity.

FILEL DK0:.BIN

The FILEL command sequentially loads each file referenced. All files must be in ABS format. (if not a checksum error will occur.) This checks that each file can be correctly loaded.

FILEG DK0:.SAV

Similar to the FILEL command except that it loads and checks contiguous (core image) files instead of ABS format files.

*FILET DK0:FILNAM.EX

The FILET command tests all files named by reading them into a buffer to make certain that no device errors occur.

The file commands normally cause printing of the names of the files checked, their transfer address, and LOCORE and HICORE values on the console terminal.

The /N switch command inhibits printing of this information, so that only error printouts are output. Switches must be specified at the end of the command string.

A.10 FLOPPY DRIVE SYSTEM TEST

a. Turn off the power switch located at the rear of the drive.

b. Connect the free end of the interface cable to the keyed connector mounted on the rear panel of the chassis. Note that the position of the clipped pin on the module connector matches the position of the plugged hole on the cable connector.

c. Remove the floppy disk drive cover and verify that the switch on the controller board is set as follows:

1	2	3	4	5	6	7	8
C	C	C	C	C	C	C	0

d. Place the XXDP+ disk in the Hawk drive and set the drive to boot to the top disk.

e. Turn on the floppy drive power switch, apply 2270 main power, and spin up the Hawk drive.

f. Insert the FRD440 diagnostics diskette in Drive 0 and a blank diskette in Drive 1 (label side up).

g. Re-initialize the DSD floppy disk system by hitting the 2270 control panel boot button. The drives can be heard and the activity lights on the front of the drives go on briefly.

h. If the system does not initialize:

1. Be sure the diskettes are inserted properly and the drive doors are closed tightly.
2. Be sure chassis power is connected to the system power controller and power switch is on.
3. Try cycling the main power several times.
4. Be sure interface bus cable is connected properly.
5. Be sure controller DIP-switch settings are correct.

i. The XXDP+ boot sequence should be displayed on the terminal.

j. Type: R ZPFDCA

k. This program boots the floppy drive and the terminal displays the diagnostic diskette command page.

l. If the system does not boot from the floppy:

1. Be sure the diskettes are inserted correctly and the FRD440 diagnostics diskette is inserted in drive 0.

2. Check the condition of the diskettes. They may not be bootable if physically damaged.

3. Be sure that the controller DIP-switch settings are correct.

m. After a successful boot, remove the FRD440 diagnostic diskette from drive 0 and replace it with a good blank diskette.

- n. The boot program results in "mode" prompt.

o. Set up for double-density mode, format diskettes, run acceptance testing, and check error status.

A.11 DSD-440 FLOPPY DISK DRIVE DIAGNOSTIC PROCEDURE

Note

When using the following procedure, enter the underlined commands where indicated. Make sure that when alphabetic characters are typed that the shift key is used.

A.11.1 DSD Floppy Disk Diagnostic With Format Capability

a. Remove diagnostic diskette.

b. Type 'A' to do acceptance test on 2 drives.

c. Type 'H' for Help list of valid commands.

d. Type 'X' to format a diskette.

e. Program will ask for unit . Type '0' or '1'.

f. Program will ask for Sequence Format. Type 'Y' for standard format, 'N' for interleaved format.

g. Insert test diskettes (both must be of the same density).

DSD FRD440 V5G

(0 - 157776)

(160010 - 160016)

(165000 - 165776)

(171000 - 171776)

(172100 - 171776)

(172300 - 172316)

(172340 - 172356)

(173000 - 173776)

(177170 - 177172)

(177400 - 177416)

(177514 - 177516)

(177546 - 177546)

(177560 - 177616)

(177640 - 177656)

(177776)

Note

These are addresses in the 2270 system that are found by the program. They will not match your configuration.

MODE: MEDIA-DEN-ALL SET DENSITY TO (S,D):D
 --
 DD MODE: XFORMAT REALLY?Y
 --
 UNIT:0<CR>

Note
 You will sometimes get
 the message:
 SET DENSITY UN0
 SET DENSITY UN1

(This may take a minute.)

SEQUENTIAL FORMAT?Y
 --

DENSITY = (S)INGLE, (D)EC-DOUBLE:D
 --

*** DELAY: NOW FORMATTING DRIVE 0 ***

DD MODE: XFORMAT REALLY?Y
 --
 UNIT:1<CR>

SEQUENTIAL FORMAT?Y
 --

DENSITY = (S)INGLE, (D)EC-DOUBLE:D
 --

*** DELAY: NOW FORMATTING DRIVE 1 ***

DD MODE: RES STATUS

DDEN UN0 BAD=0 RD/WRT=1 XFERS=0 B-DATA=0
 UN1 BAD=0 RD/WRT=1 XFERS=0 B-DATA=0
 RESET ALL? Y
 --

*** NOTE: AFTER TYPING "A" THERE WILL BE A 45 MIN. TEST ***

DD MODE: ACCEPTANCE TEST SCAN CRC CHECKED WRITING READING INTERRUPT
 --
 ENABLED WRITING READING FILL-EMPTY RANDOM-RD/WRT READING
 DEN=0

PASS FIN

UN0 BAD=0 RD/WRT=12667 XFERS=35943 B-DATA=0
 UN1 BAD=0 RD/WRT=12640 XFERS=10960 B-DATA=0

*^2 ^3 ^4 ^5 ^6 ^7 ^10 ^11 ^12 ^13 ^14 ^15 ^16 ^17 ^20 ^21 ^22 ^23 ^24
 ^25 ^26 ^27 * <CTRL R>

DD MODE: STATUS

DDEN UN0 BAD=0 RD/WRT=34064 XFERS=59617 B-DATA=0
 UN1 BAD=0 RD/WRT=33978 XFERS=21858 B-DATA=0

DD MODE: (At this point the Acceptance Test is complete.)

If the error status results in "BAD=0" and "BAD-Data=0", the drive system is considered functionally acceptable. Halt the computer, remove both diskettes, and reboot the system normally.

A.12 ADDITIONAL INFORMATION:

Some FRD440 control characters:

CTRL R....Restarts program at the prompt
CTRL Y....Restarts test specified at last prompt
CTRL X....Sets expanded RX02 error printout mode
<LF> Types track, sector, and status count for current unit

Duplicate diagnostic diskettes as follows:

- a. Boot up the floppy drive.
- b. Leave the master diskette in drive 0.
- c. Place a blank write-enabled diskette in drive 1.
- d. Enter the following command:

```
MODE:DUPLICATE SRC- UNIT 0<CR>
    ---          -----
    ONTO DST- UNIT:1<CR>
```

(This procedure takes approximately 10 minutes.)

CHAPTER 2

DIGITAL EQUIPMENT CORPORATION'S XXDP+ USER MANUAL

Contents—Chapter 2

Section and Paragraph	Page	Section and Paragraph	Page
1 XXDP+ NAMING CONVENTIONS		5 OPERATING INSTRUCTIONS FOR SUPERVISOR DIAGNOSTICS	
1.1 Naming and Packaging Conventions	1-1	5.1 Operating Instructions for Supervisor Diagnostics	1-21
1.1.1 General	1-1	5.1.1 How to Run this Type of Diagnostic	1-21
1.1.2 XXDP+ Device Support	1-2	5.1.2 Details of Commands and Syntax	1-24
1.1.3 XXDP+ XXDP+ Naming Conventions	1-2	5.1.3 Extended P-Table Dialogue	1-26
1.1.4 XXDP+/PDP-11 Diagnostic Supervisor Software Catalogue	1-3		
1.1.5 XXDP+ Media Packaging Guidelines	1-6	6 XXDP+ SETUP UTILITY	
2 XXDP+ MONITOR		6.1 Introduction	1-27
2.1 Monitor Operation	1-6	6.1.1 Program Description	1-27
2.2 Set the Fill Count	1-7	6.1.2 Errors	1-29
2.3 Obtaining a Directory	1-7	APPENDIX A—XXDP+ HELP FILES	
2.4 Loading and Running Programs	1-7	A.1 XXDP+ Monitor	1-30
2.5 Chain Mode Operation	1-7	A.1.1 XXDP+ Monitor Commands	1-30
2.6 Running a Chain	1-8	A.1.2 Boot Time Questions	1-30
2.7 Enable Command	1-8	A.1.3 Enable Commands	1-30
2.8 Help Command	1-8	A.1.4 Directory Utility	1-30
2.9 XXDP+ Monitor Errors	1-8	A.2 XXDP+ Utilities	1-30
3 XXDP+ UPDATE PROGRAMS		A.2.1 XXDP+ UPD1 Utility Commands	1-30
3.1 Introduction	1-9	A.2.2 XXDP+ UPD2 Utility Commands	1-31
3.2 Command Descriptions—UPD2	1-9	A.2.3 PIP/File Rules	1-31
3.3 Command Descriptions—UPD1	1-14	A.2.4 XXDP+ XTECO Utility Commands	1-31
3.4 UPD1/UPD2 Errors	1-14	A.2.5 Zeroing a System Device	1-31
4 XTECO—XXDP+ TEXT EDITOR		A.3 Miscellaneous Operations	1-32
4.1 Introduction	1-15	A.3.1 Non-Standard CSR	1-32
4.2 XTECO Command Description	1-15	A.3.2 Chaining Utilities	1-32
4.2.1 Text, Edit, and Teco Commands	1-16	A.3.3 How to Merge XXDP+ Software Onto Your Disk	1-32
4.2.2 Teco Command	1-17	A.3.4 How to Merge Your XXDP+ Tape Onto an XXDP+ Tape	1-32
4.2.3 Editing Command String Syntax	1-17	A.3.5 How to Build XXDP+ Disk from Scratch	1-32
4.2.4 Command Arguments	1-18	A.3.6 How to Build XXDP+ Tape from Scratch	1-32
4.2.5 XTECO Edit Commands	1-18	A.3.7 Loading an Oversize Diagnostic	1-32
4.3 XTECO Errors	1-20	A.4 XXDP+ Naming Conventions	
		A.4.1 XXDP+ Monitor and Device Driver Naming Conventions	1-33
		A.4.2 XXDP+ Utility Naming Conventions	1-33
		APPENDIX B—KNOWN BUGS	

IDENTIFICATION

PRODUCT CODE: AC-F348C-MC

PRODUCT NAME: CHQUSC0 XXDP+/SUPP USER MAN

PRODUCT DATE: APRIL, 1979

MAINTAINER: DIAGNOSTIC ENGINEERING GROUP

THE INFORMATION IN THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE AND SHOULD NOT BE CONSTRUED AS A COMMITMENT BY DIGITAL EQUIPMENT CORPORATION. DIGITAL EQUIPMENT CORPORATION ASSUMES NO RESPONSIBILITY FOR ANY ERRORS THAT MAY APPEAR IN THIS DOCUMENT.

NO RESPONSIBILITY IS ASSUMED FOR THE USE OR RELIABILITY OF SOFTWARE ON EQUIPMENT THAT IS NOT SUPPLIED BY DIGITAL OR ITS AFFILIATED COMPANIES.

COPYRIGHT (C): 1979 BY DIGITAL EQUIPMENT CORPORATION

THE FOLLOWING ARE TRADEMARKS OF DIGITAL EQUIPMENT CORPORATION:

DIGITAL
DEC

PDP
DECUS

UNIBUS
DECTAPE

MASSBUS
DECX/11

TABLE OF CONTENTS

CHAPTER 1	XXDP+ NAMING CONVENTIONS
CHAPTER 2	XXDP+ MONITOR
CHAPTER 3	XXDP+ UPDATE UTILITIES
CHAPTER 4	XXDP+ TEXT EDITOR
CHAPTER 5	OPERATING INSTRUCTIONS FOR DIAGNOSTIC SUPERVISOR
CHAPTER 6	SETUP UTILITY
APPENDIX A	XXDP+ HELP FILE
APPENDIX B	KNOWN BUGS

SEG 0003

CHAPTER 1

XXDP+ NAMING CONVENTIONS

1.1 NAMING AND PACKAGING CONVENTIONS

1.1.1 GENERAL

THIS CHAPTER DESCRIBES THE NEW PACKAGING SCHEME TO BE USED for XXDP+ related software. The scheme is radically different than the existing XXDP software which it replaces. The differences are for the better, a statement with which we hope you will agree. Other than the packaging differences, XXDP+ is an upwards compatible replacement for XXDP.

The development of XXDP+ was prompted primarily by three issues:

1. Support of an interim of pre-supervisor as well as supervisor-compatible PDP-11 diagnostics in a manner which is as transparent to the user as possible.
2. Provide for the real-time retrieval of data from an XXDP+ medium by a user program. This provision was primarily of importance in supporting the retrieval of micro-diagnostics to be used in testing intelligent sub-systems. Other applications have since become evident.
3. Provide for ease of expansion of XXDP+ utilities in their support of new mass-storage devices. The actual method chosen was to implement a retrievable device driver scheme. This means that the device drivers implied by a user command are retrieved as opposed to being part of the binary image of the utilities as is the case in the existing XXDP utilities.

1.1.2 Xxdp+ Device Support

Device Mnemonic	Devices Supported	••If Diag. Release Media	If XXDP+ Monitor	If XXDP+ Utility Driver	XXDP+ Generic Name dmdp+	• Old XXDP Generic Name
CT	TA11/TU60 Cassette		X	X	CTDP+	TAADP
DB	RPA4/5/6 DISK		X	X	DBDP+	RHDP
DD	DL11/TU58 Cassette	X	X	X	DDDP+	(None)
DK	RK11/RK05 Disk	X	X	X	DKDP+	RKDP
DL	RL11/RL01 Disk	X	X	X	DLDP+	WLDP
DM	RK611/RK06/7 Disk	X	X	X	DMDP+	RMDP
DP	RP11/RP02/3 Disk		X	X	DPDP+	RPDP
DR	RM02/3 Disk		X	X	DRDP+	RMDP
DS	RS03/4 Disk		X	X	DSDP+	RSDP
DT	TC11 DECTape	X	X	X	DTDP+	TCUP
DX	RX11/RX01 Floppy	X	X	X	DXDP+	RKDP
DY	RX211/RX02 Floppy	X	X	X	DYDP+	RYDP
KR	Low-speed PT Reader	Limited		X	(None)	(None)
MM	TMO2/TMO3 Magtapes	X	X	X	MMDP+	TMDP
MT	TM11 Magtapes	X	X	X	MTDP+	TMDP
PD	PDT/TU58 CASSETTE	LIMITED	X	X	PDDP+	(None)
PP	High-speed PT Punch	Limited		X	(None)	(None)
PR	High-speed PT Reader	Limited		X	(None)	(None)
PT	Low-speed PT Punch	Limited		X	(None)	(None)

• The "Old XXDP Generic Name" is given as an aid in translating the past into the present. These names are not used in the XXDP+ system.

•• Refer to the Maindec Index and/or Digital Software Catalogue for ordering information.

XXDP+ NAMING CONVENTIONS

Page 1-3

510-1006

1.1.3 Xxdp+ Naming Conventions

In deriving the naming conventions for XXDP+, an attempt has been made to clear up some of the naming inconsistencies in the XXDP software which XXDP+ replaces.

Note: In the following descriptions, the special symbols used have the indicated meanings:

- dm Device mnemonic (DK = RK11/RK05)
- rp Revision level (r), Patch level (p)
- yy Two arbitrarily chosen characters

It should also be noted that .SYS files are binary files which may be loaded, but cannot be directly executed.

The following rules govern all XXDP+ product related names:

1. Device mnemonics are identical to those used within the Digital PDP-11 software community unless it is impossible to comply.
2. All XXDP+ software has a Diagnostic Package Code starting with the letters "CH".
3. XXDP+ Monitors:
 1. Package Code/Title format is:

CHmdmp XXDP+ dm MONITOR BIN
 2. Filename format of binary file is:

HMdmp.SYS
 3. Filename format of core image file (on sequential access mass-storage devices only) is:

HMdmp.SAV
4. XXDP Device Drivers:
 1. Package Code/Title format is:

CHDmdp XXDP+ dm x DRV BIN

(Note: x is: "R/W" for Read/Write
"R/O" for Ready Only
"W/O" for Write Only)

2. Filename format of binary file is:
MDdmp,SY5
5. XXDP Utility Programs:
1. Package Code/Title format is:
CMUyyrp XXDP+ etc.
2. Filename conventions are random dependent on human interfacing requirements. They may or may not be derived from the package code.
6. All PDP-11 Diagnostic Supervisor Versions:
1. Package Code/Title format is:
CHSyrrp etc.
2. Filename format of binary file is:
HSyyrp,SY5
7. XXDP+/PDP-11 Diagnostic Supervisor Miscellaneous:
1. Package Code/Title format is:
CMQyyrp etc.
2. Filename conventions, if files are present, are random dependent on human interfacing requirements. They may or may not be derived from the package code.
8. XXDP+ Package Names will be derived from the device mnemonic as follows:
- dMDP+
- For example, the XXDP RK05 Package, RKDP, becomes the XXDP+ package RKDP+.

1.1.4 Xxdp+/pdp-11 Diagnostic Supervisor Software Catalogue

The following lists comprise the entirety of XXDP+ software.

1.1.4.1 XXDP+ MONITORS (CHMDMRP)

-----Title----->	Filename(Core Image Filename)	PT	DOC	LST	File
Pkg. Code					

CHMCTAP XDP+ CT MONITOR BIN	HMCTAP.SYS (HMCTAP.SAV)				X
CHMDPAP XDP+ DP MONITOR BIN	HMDPAP.SYS				X
CHMDAPQ XDP+ DQ MONITOR BIN	HMDAPQ.SYS				X
CHMDKAP XDP+ DK MONITOR BIN	HMDKAP.SYS				X
CHMDLAP XDP+ DL MONITOR BIN	HMDLAP.SYS				X
CHMDMAP XDP+ DM MONITOR BIN	HMDMAP.SYS				X
CHMDPAP XDP+ DP MONITOR BIN	HMDPAP.SYS				X
CHMDRAP XDP+ DR MONITOR BIN	HMDRAP.SYS				X
CHMDSAP XDP+ DS MONITOR BIN	HMDSAP.SYS				X
CHMDTAP XDP+ DT MONITOR BIN	HMDTAP.SYS				X
CHMDXAP XDP+ DX MONITOR BIN	HMDXAP.SYS				X
CHMDYAP XDP+ DY MONITOR BIN	HMDYAP.SYS				X
CHMHMAP XDP+ HM MONITOR BIN	HMHMAP.SYS (HMHMAP.SAV)				X
CHMHTAP XDP+ HT MONITOR BIN	HMHTAP.SYS (HMHTAP.SAV)				X
CHMPDAP XDP+ PD MONITOR BIN	HMPDAP.SYS				X

1.1.4.2 XXDP+ DRIVERS (CHDDMRP)

-----Title-----	Filename	PT	DOC	LST	File
Pkg. Code					
CHDCTA0 XXDP+ CT R/W DRV BIN	HDCTA0.SYS				X
CHDDBA0 XXDP+ DB R/W DRV BIN	HDDBA0.SYS				X
CHDDDA0 XXDP+ DD R/W DRV BIN	HDDDA0.SYS				X
CHDDKA0 XXDP+ DK R/W DRV BIN	HDDKA0.SYS				X
CHDDL10 XXDP+ DL R/W DRV BIN	HDDL10.SYS				X
CHDDMA0 XXDP+ DM R/W DRV BIN	HDDMA0.SYS				X
CHDDPA0 XXDP+ DP R/W DRV BIN	HDDPA0.SYS				X
CHDDRA0 XXDP+ DR R/W DRV BIN	HDDRA0.SYS				X
CHDDSA0 XXDP+ DS R/W DRV BIN	HDDSA0.SYS				X
CHDCTA0 XXDP+ DT R/W DRV BIN	HDDTA0.SYS				X
CHDDXA0 XXDP+ DX R/W DRV BIN	HDDXA0.SYS				X
CHDDYA0 XXDP+ DY R/W DRV BIN	HDDYA0.SYS				X
CHDKBA0 XXDP+ KB P/O DRV BIN	HDKBA0.SYS				X
CHDDMA0 XXDP+ KM R/W DRV BIN	HDDMA0.SYS				X
CHDMTA0 XXDP+ MT R/W DRV BIN	HDMTA0.SYS				X
CHDDPA0 XXDP+ PD R/W DRV BIN	HDDPA0.SYS				X
CHDDPA0 XXDP+ PP W/O DRV BIN	HDDPA0.SYS				X
CHDPPRA0 XXDP+ PP R/O DRV BIN	HDDPRA0.SYS				X
CHDPTA0 XXDP+ PT W/O DRV BIN	HDDPTA0.SYS				X

1.1.4.3 XXDP+ UTILITIES (CHUYYP)

-----Title-----	Filename	PT	DOC	LST	File
Pkg. Code					
CHUP1A0 XXDP+ UPD1 UTIL	UPD1.BIN				X
CHUP2A0 XXDP+ UPD2 UTIL	UPD2.BIN				X
CHUTEA0 XXDP+ XTECO UTIL	XTECO.BIN				X
CHUXCA0 XXDP+ DEC/X11 CNF/LNK	DXCL.BIN				X
CHUSUA0 XXDP+ SETUP UTIL	SETUP.BIN				X
CHUIA0 XXDP+ MONTD DTP BIN	HUDIA0.SYS				X

1.1.4.4 PDP-11 DIAGNOSTIC SUPERVISOR VERSION (CHSYYP)

-----Title----->	Filename	PT	DOC	LST	File
Pkg. Code					
CHSAAA0 XIDP+ DIAG SUPR BIN	MSAAA0.SYS			R	X
CHSABA0 PT/AMS DIAG SUPR BIN	MSABA0.SYS	X		R	X

-

1.1.4.5 XIDP+/PDP-11 DIAGNOSTIC SUPERVISOR MISCELLANEOUS (CHQYYP)

-----Title----->	Filename	PT	DOC	LST	File
Pkg. Code					
CHQUSA0 XIDP+/SUPR USER MAN			X		
CHQSA00 XIDP+/SUPR SOURCES			Composite Mastape (R)		
CHQHLP0 XIDP+ HELP TEXT FILE	HELP.TXT				X

1.1.5 XXDP: MEDIA PACKAGING GUIDELINES

The following guidelines must be followed when building all types of XXDP: mass-storage media.

1. Every piece of media must contain at a minimum the following files in the order given at the very beginning of the medium.
 1. Bootable monitor(s) for that medium
 2. HSAArp.SYS (CHSAArp XXDP: DIAG SUPR RIN)
 3. HUIrP.SYS (CHUIrP XXDP: MONTR DIR RIN)

(The bootable monitors for random access devices do not appear in the directory. The bootable monitors for sequential access devices (magtapes and TUA60 Cassette) appear as the files HMDrP.SAV files.)
2. For each type of media, where there is sufficient storage capacity, there must be one medium that contains at a minimum the following files in the order given immediately following the files specified in Guideline #1.
 1. HELP.TXT (CHQNLrP XXDP: HELP TEXT FILE)
 2. HMDrP.SYS (CHMDrP all XXDP: device drivers)
 3. All XXDP: utility programs (CHU7777) not already mentioned.
 4. All versions of the Diagnostic Supervisor (CHS7777) not already mentioned.
 5. HMDrP.SYS (CHMDrP all XXDP: monitor binaries)
3. For those media types which do not have enough storage capacity to comply with Guideline #2, the following applies:
 1. Always satisfy Guideline #1.
 2. Accomplish as much of Guideline #2 as possible.
 3. UPD7.RIN (CHUP7rP) must coexist on the same medium with all device drivers (CHD7777).

SFW 0013

CHAPTER 2

XXDP: MONITOR

2.1 MONITOR OPERATION

START THE EXECUTION OF THE XXDP: MONITOR BY USING THE APPROPRIATE BOOTSTRAP PROGRAM. OPERATING INSTRUCTIONS FOR BOOTSTRAP PROGRAMS ARE NOT GIVEN IN THIS MANUAL. THE DEVICE USED IS REFERRED TO IN THIS MANUAL AS THE SYSTEM DEVICE. THE MONITOR WILL PRINT A MESSAGE IDENTIFYING ITSELF AND REQUESTING THAT THE CURRENT DATE BE ENTERED. AN EXAMPLE OF THIS MESSAGE IS GIVEN BELOW FOR THE XXDP: MONITOR.

```
CHMDKAB XXDP: DK MONITOR NAK
BOOTED VIA UNIT 1 0
ENTER DATE: (DD=MM=YY):
```

THE DATE SHOULD BE ENTERED IN THE FOLLOWING FORMAT: DD IS THE ONE OR TWO CHARACTER DAY, MM IS THE THREE CHARACTER MONTH AND MUST BE ONE OF THE FOLLOWING: JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC, YY IS THE TWO CHARACTER YEAR.

AFTER THE DATE HAS BEEN ACCEPTED BY THE MONITOR, THE RESTART ADDRESS OF THE MONITOR IS PRINTED.

THEN THE FOLLOWING TWO QUESTIONS ARE ASKED:

```
SO HZ?  N
LSI?    N
```

THE DEFAULTS ARE BOTH "NO". THE ANSWERS GIVEN ARE SUBSEQUENTLY COMMUNICATED TO CERTAIN DIAGNOSTICS.

2.2 SET THE FILL COUNT

THE TERMINAL OUTPUT ROUTINE OF THE MONITOR OUTPUTS A VARIABLE NUMBER OF FILLER CHARACTERS AFTER A CARRIAGE RETURN. THESE FILLER CHARACTER PROVIDE A TIME DELAY FOR THE CARRIAGE RETURN. SOME TERMINALS REQUIRE MORE DELAY THAN OTHERS TO AVOID OVER-PRINTING.

THE NUMBER OF FILLER CHARACTERS CAN BE CHANGED BY MEANS OF THE F COMMAND. TYPE:

F<CR>

000014 1 THE 000014 IS TYPED BY THE PROGRAM AND
INDICATES THE CURRENT FILLER COUNT. THE 1
INDICATES THE USER TYPED A FILLER COUNT OF 1.

2.3 OBTAINING A DIRECTORY

TO OBTAIN A DIRECTORY OF THE SYSTEM DEVICE, TYPE ONE OF THE FOLLOWING:

D<CR> TO OBTAIN DIRECTORY ON CONSOLE TERMINAL, OR
D/F<CR> TO OBTAIN SHORTENED OR "FAST" DIRECTORY ON CONSOLE
TERMINAL, OR
D/L<CR> TO OBTAIN DIRECTORY ON LINE PRINTER. LINE PRINTER MUST
BE PRESENT ON SYSTEM. NO CHECK IS MADE FOR IT.
D/L/F<CR> TO OBTAIN FAST DIRECTORY ON LINE PRINTER.

THE DIRECTORY CONTAINS THE FOLLOWING INFORMATION:

FILNAM,EXT	FILE NAME AND EXTENSION ASSIGNED.
LENGTH	NUMBER OF BLOCKS USED. DECIMAL NUMBER.
START	STARTING BLOCK NUMBER. OCTAL NUMBER.
DATE	DATE WHEN FILE WAS PUT ON MEDIUM.

2.4 LOADING AND RUNNING PROGRAMS

1. TYPE P AND THE PROGRAM NAME. DO NOT TYPE THE EXTENSION. HOWEVER, THE ACTUAL FILE MUST HAVE A BIN OR RTC EXTENSION. THIS WILL LOAD AND RUN THE PROGRAM. TO JUST LOAD THE PROGRAM TYPE L AND THE PROGRAM NAME. ONCE THE PROGRAM IS LOADED, TYPE S TO START THE PROGRAM. THE S COMMAND SHOULD BE USED IMMEDIATELY AFTER THE L COMMAND. IF OTHER COMMANDS ARE USED BETWEEN THE L AND S COMMANDS, THE PROGRAM PREVIOUSLY LOADED MAY BE DESTROYED, BECAUSE CERTAIN MONITOR COMMANDS CAUSE SPECIAL UTILITY PROGRAMS TO RUN; THESE SPECIAL PROGRAMS OCCUPY LOWER MEMORY.
2. IF A TYPING ERROR IS MADE, DEPRESS THE DELETE OR RUBOUT KEY FOR EACH CHARACTER YOU WISH TO REMOVE FROM THE DATA PREVIOUSLY ENTERED. THIS MUST BE DONE BEFORE THE CARRIAGE RETURN IS DEPRESSED.
3. TO ABORT THE FUNCTION IN PROGRESS AND RETURN TO MONITOR COMMAND MODE, SIMULTANEOUSLY DEPRESS THE CTRL AND C KEYS (CTRL-C). THERE MAY BE A TIME-DELAY BEFORE THE COMMAND MODE IS REENTERED.
4. TO FREEZE OUTPUT GOING TO THE TERMINAL OR LINE PRINTER, TYPE A CTRL-S (XOFF). TO ALLOW PRINTING TO RESUME, TYPE A CTRL-Q (XON).

2.5 CHAIN MODE OPERATION

CHAIN MODE OPERATION CONSISTS OF THE SEQUENTIAL EXECUTION OF PROGRAMS WITHOUT OPERATOR INTERVENTION. ONLY PROGRAMS THAT HAVE BEEN MODIFIED TO RUN IN CHAIN MODE CAN BE CHAINED. CHAINABLE PROGRAMS ARE IDENTIFIED IN THE DIRECTORY BY A BIC EXTENSION.

TO RUN CHAIN MODE, THE XXDP+ MONITOR USES AN ASCII FILE (KNOWN AS A CHAIN FILE) LISTING THE PROGRAMS TO BE RUN AND THE NUMBER OF PASSES EACH PROGRAM SHOULD RUN. THIS FILE MUST BE ON THE SYSTEM DEVICE.

A CHAIN FILE MAY BE GENERATED BY USE OF THE XTECO TEXT EDITOR. THE FILE MUST HAVE A CCC EXTENSION. THE CHAIN FILE MAY CONTAIN ANY OF THE COMMANDS SUPPORTED BY THE XXDP+ MONITOR. THE COMMANDS IN THE ASCII FILE ARE EXECUTED IN THE ORDER IN WHICH THEY ARE ENCOUNTERED. COMMENTS MAY BE INCLUDED IN THE FILE.

THE FOLLOWING EXAMPLE ILLUSTRATES A CHAIN FILE.

```

-CPU.CCC
:THIS CHAIN EXERCISES THE XYZ PROCESSOR,
:
R D0AA/5          RUN T1 5 PASSES
R D0RA/1000       RUN T2 1000 PASSES
R D0LA/1000       RUN T3 1000 PASSES
R D0DA/1000       RUN T4 1000 PASSES
R D0EA/1000       RUN T5 1000 PASSES
R D0FA/1000       RUN T6 1000 PASSES
R D0GA/1000       RUN T7 1000 PASSES
R D0HA          RUN T8 ONE PASS
R D0JA/1000       RUN T9 1000 PASSES
R D0XA/1000       RUN T10 1000 PASSES
R D0LA/1000       RUN T11 1000 PASSES
R D0MA/1000       RUN T12 1000 PASSES
L D0NA          LOAD T13
S/1000          START IT, RUN 1000 PASSES
C CPU          SUBMIT CHAIN FILE AGAIN

```

2.6 RUNNING A CHAIN

TO EXECUTE A CHAIN FILE THE USER TYPES:

```

C FILNAM<CH>      OR
C FILNAM<QCK>

```

IN THE FIRST CASE THE PASS COUNT SPECIFIED IN THE CHAIN FILE IS USED BY THE XDP+ MONITOR TO DETERMINE THE NUMBER OF PASSES TO EXECUTE EACH PROGRAM. IN THE SECOND CASE THE PASS COUNT IS NOT USED AND EACH PROGRAM IS EXECUTED ONLY ONCE; THE /Q SWITCH PROVIDES A SINGLE EXECUTION MODE OF OPERATION OR QUICK VERIFY.

WHEN PROGRAMS ARE RUN IN CHAIN MODE, THE HAFD-HAFS/SOFTWARE SWITCH REGISTER SHOULD BE SET TO HAFD-HAFS.

THE XDP+ MONITOR PRINTS EACH COMMAND TAKEN FROM THE CHAIN FILE AND THEN EXECUTES THE COMMAND.

WHEN THE LAST COMMAND OTHER THAN ANOTHER C COMMAND HAS BEEN EXECUTED, THE XDP+ MONITOR TERMINATES CHAIN MODE AND TYPES A PROMPT(.). IT IS READY TO ACCEPT ANOTHER COMMAND FROM THE CONSOLE. IF THE LAST COMMAND IS ANOTHER C COMMAND, THE CHAIN MODE WILL CONTINUE AND THE CHAIN FILE SPECIFIED BY THIS NEW C COMMAND WILL BE USED.

IF THE USER WISHES TO TERMINATE CHAIN MODE BEFORE ITS NORMAL TERMINATION HE MAY DO SO BY TYPING A CTRL-C. HOWEVER, THE MONITOR WILL NOT ABORT THE CHAIN MODE UNTIL IT RECEIVES PROGRAM CONTROL FROM THE PROGRAM CURRENTLY RUNNING.

2.7 "ENABLE" COMMAND

IT IS POSSIBLE TO CHANGE THE MONITOR'S MEMORY OF WHAT DRIVE IT WAS BOOTED FROM BY TYPING "E UNIT" FOR EXAMPLE, IF THE BOOT WAS FROM DRIVE 0 AND THE OPERATOR TYPES "E 1", THEN ALL SUBSEQUENT MONITOR COMMANDS WILL CAUSE THE MEDIUM ON DRIVE 1 TO BE ACCESSSED.

2.8 "HELP" COMMAND

FOR A COMPLETE HELP FILE DESCRIBING MONITOR AND UTILITY OPERATION, TYPE "H" OR "H/L" (A SWITCH USES LINE PRINTER).

2.9 XDP+ MONITOR ERRORS

```

? BAD VALUE          A NON-NUMERIC VALUE WAS ENTERED AS A NUMBER.
? CKSUM ERR          CHECKSUM ERROR OCCURRED DURING A LOAD.
? LOOKUP ERROR FILENAME NON EXISTENT FILE ON DEVICE DRIVE. THE
                     FILENAME THAT WAS SEARCHED FOR IS PRINTED.
? ODD ADDR           INVALID ADDRESS. MUST BE AN EVEN ADDRESS.
? HD-DEV ERR         DEVICE ERROR ON INPUT DEVICE

```

2.10 SUMMARY OF COMMANDS

FOR A SUMMARY OF MONITOR COMMANDS, SEE APPENDIX A (HELP.TXT).

CHAPTER 3

XXDP+ UPDATE PROGRAMS

3.1 INTRODUCTION

XXDP+ HAS TWO UTILITY PROGRAMS TO BE USED FOR FILE MAINTENANCE. THESE PROGRAMS ARE CALLED UPD1 AND UPD2. THE UPD1 PROGRAM OCCUPIES 4K OF MEMORY AND CAN LOAD/MODIFY/DUMP A 4K FILE WHEN RUNNING ON AN 8K SYSTEM. THE UPD2 PROGRAM WILL ALSO RUN ON AN 8K SYSTEM BUT CAN NOT LOAD A 4K FILE THERE. THE COMMANDS ACCEPTED BY UPD1 ARE A SUBSET OF THE COMMANDS ACCEPTED BY UPD2.

THE UPD1 PROGRAM IS STANDALONE AND DESTROYS THE CORE IMAGE OF THE XXDP+ MONITOR. THE BOOT COMMAND MUST BE USED TO RETURN TO THE MONITOR. THE UPD2 PROGRAM, ON THE OTHER HAND, IS NOT STANDALONE AND SHARES MEMORY WITH THE MONITOR. UPD2 USES CERTAIN FUNCTIONS MADE AVAILABLE BY THE MONITOR. THE EXIT COMMAND IS USED TO RETURN TO THE MONITOR.

NEITHER UPD1 OR UPD2 CONTAIN READ/WRITE DRIVERS FOR DEVICES. THESE DRIVERS ARE RESIDENT ON THE SYSTEM DEVICE AS SYS FILFS. THEY ARE TRANSFERRED TO MEMORY AS THEY ARE NEEDED.

3.2 COMMAND DESCRIPTIONS - UPD2

BOTH UTILITY PROGRAMS PRINT AN ASTERISK (*) AS A PROMPT FOR THEIR COMMAND MODE. THE VALID COMMANDS FOR THE UPD2 UTILITY ARE NEXT DESCRIBED. SOME OF THE COMMANDS DESCRIBED BELOW ALLOW THE USE OF WILDCARDS IN THE FILENAME AND EXTENSION. WILDCARDS ARE THE * AND ? CHARACTERS. THESE CHARACTERS MAY BE PLACED IN FILENAMES AND EXTENSIONS TO INDICATE THAT ANY CHARACTERS ARE VALID IN THE CHARACTER POSITIONS INDICATED BY THE WILDCARDS. THE * WILDCARD INDICATES ALL CHARACTER POSITIONS FROM THE POSITION OF THE * TO THE END OF THE FILENAME OR EXTENSION ARE WILD. THE ? WILDCARD INDICATES ONLY THE CHARACTER POSITION OCCUPIED BY THE ? CHARACTER IS WILD.

THE CHARACTER ? IS ACCEPTED FOR THE CHARACTER *.

XXDP+ UPDATE PROGRAMS

Page 3-2

SEC 0218

THE FOLLOWING EXAMPLES ILLUSTRATE THE USE OF WILDCARDS:

```

Z*.BIN          ALL FILES BEGINNING WITH
                  Z AND HAVING EXTENSIONS OF .BIN

Z?????.BIN      ALL FILES BEGINNING WITH
                  Z AND HAVING EXTENSIONS OF .BIN

*.*             ALL FILES REGARDLESS OF
                  FILENAMES AND EXTENSIONS

```

3.2.1 DIR COMMAND

THE DIRECTORY COMMAND CAUSES THE DIRECTORY OF THE SPECIFIED DEVICE TO BE PRINTED. WILDCARDS ARE ALLOWED. THE FORMAT OF THE COMMAND IS: DIR DDN1:FILNAM,EXT<CP>. DDN1 IS THE TWO CHARACTER DEVICE DESIGNATOR AND UNIT NUMBER. IF DDN1 IS OMITTED, THE DIRECTORY WILL BE OBTAINED FROM THE SYSTEM DEVICE. FILNAM,EXT IS THE NAME OF THE FILE(S) THAT WILL BE SEARCHED FOR IN THE DIRECTORY. IF FILNAM,EXT IS OMITTED, A DIRECTORY OF ALL FILES WILL BE PRINTED.

COMMAND EXAMPLES:

```

DIR DDN1        GIVES A DIRECTORY OF ALL FILES ON DEV.

DIR *.BIN       GIVES A DIRECTORY OF ALL FILES WITH A
                  .BIN EXTENSION. THE SYSTEM DEVICE IS USED.

DIR DDN1*.BIN   GIVES A DIRECTORY OF ALL FILES WITH
                  EXTENSIONS BEGINNING WITH BI.

DIR ZTC????.BIN GIVES A DIRECTORY OF ALL FILES WITH
                  THE FIRST THREE CHARACTERS OF THE
                  FILENAME BEING "ZTC" AND HAVING
                  EXTENSIONS BEGINNING WITH BI.
                  THE SYSTEM DEVICE IS USED.

```

CONSIDER THE FOLLOWING EXAMPLE:

*DIR DDN1:

ENTRY:	FILNAM,EXT	DATE	LENGTH	START
000001	A .BIN	2-AUG-72	14	000105
000002	B .BIN	2-AUG-72	120	000106

FILNAM,EXT IS THE NAME OF THE FILE.

DATE IS THE FILE CREATION DATE.

LENGTH IS THE NUMBER OF BLOCKS (DECIMAL) THE FILE OCCUPIES, A BLOCK IS 256 WORDS (DECIMAL). A "C" AFTER THE FILE LENGTH INDICATES THE FILE IS CONTIGUOUS.

START IS THE BLOCK NUMBER (OCTAL) OF FIRST BLOCK OF THE FILE.

THE DIRECTORY COMMAND ACCEPTS TWO SWITCHES, THE "/F" SWITCH GIVES A "FAST" DIRECTORY CONTAINING ONLY THE ENTRY AND FILENAME, THE "/L" SWITCH CAUSES THE DIRECTORY TO BE PRINTED ON THE LPI1 PRINTER.

3.2.2 CLR COMMAND

THE CLR COMMAND SETS TO ZERO ALL LOCATIONS IN THE BUFFER AREA USED FOR LOADING/MODIFYING/DUMPING FILES TO/FROM A MEDIUM. THE FORMAT OF THE COMMAND IS: CLR<CR>.

3.2.3 LOAD COMMAND

THE LOAD COMMAND LOADS FILES STORED IN ABS FORMAT INTO A BUFFER AREA WITHIN THE UTILITY PROGRAM. CHECKSUM TESTS ARE PERFORMED ON THE FILES. THE FORMAT OF THE COMMAND IS: LOAD DDN:FILNAM.EXT<CR>

IF THE DDN: IS OMITTED, THE FILE WILL BE LOADED FROM THE SYSTEM DEVICE.

IF THE DEVICE HAS NO DIRECTORY, THEN THE FILE NAME AND EXTENSION SHOULD BE OMITTED. FOR EXAMPLE: LOAD PR1<CR> WILL LOAD FROM THE PAPER-TAPE READER.

FOLLOWING THE LOAD, CERTAIN INFORMATION IS PRINTED.

XFRADR: INDICATES THE STARTING ADDRESS OF THE PROGRAM LOADED. IF IT IS ODD, THE PROGRAM IS NOT SELF-STARTING.

CORE: LEFT NUMBER INDICATES THE LOWEST LOCATION LOADED INTO DURING THE LOAD. THIS VALUE IS KNOWN AS THE LOCORE VALUE. THE RIGHT NUMBER INDICATES THE HIGHEST LOCATION LOADED INTO DURING THE LOAD. THIS VALUE IS KNOWN AS THE HICORE VALUE. THE LEFT AND RIGHT NUMBERS IN EFFECT INDICATE THE CORE LIMITS OF THE PROGRAM. THESE CORE LIMITS ARE RELATIVE TO THE BUFFER AREA WITHIN THE UTILITY.

WILDCARDS ARE ALLOWED AND WILL CAUSE MORE THAN ONE FILE TO BE LOADED. THE FILES LOAD INTO THE SAME BUFFER IN THE UTILITY PROGRAM. THE USE OF WILDCARDS WITH THIS COMMAND IS ONE WAY OF PERFORMING CHECKSUM TESTS ON A GROUP OF FILES.

3.2.4 DUMP COMMAND

CONTENTS OF THE BUFFER AREA WITHIN THE UTILITY CAN BE WRITTEN TO A XSDP+ MEDIUM IN ABS FORMAT BY THE DUMP COMMAND. THE FORMAT OF THE COMMAND IS: DUMP DDN:FILNAM.EXT.

IF THE DDN: IS OMITTED, THE FILE WILL BE STORED ON THE SYSTEM DEVICE.

PROCESSING STARTS FROM PROGRAM'S LOCORE LIMIT AND PROCEEDS TO BUT DOES NOT INCLUDE THE PROGRAM'S HICORE LIMIT. THE DATE THAT IS GIVEN THE FILE IS THE ONE ENTERED WHEN THE MONITOR WAS BOOTED.

3.2.5 XFR COMMAND

ONCE A PROGRAM HAS BEEN LOADED INTO THE BUFFER AREA WITHIN THE UTILITY VIA THE LOAD COMMAND, IT CAN BE MADE SELF-STARTING OR NOT SELF-STARTING AT THE USER'S DISCRETION. AS DESCRIBED UNDER LOAD COMMAND, THE LOAD ROUTINE TYPES: XFRADR: XXXXXX INDICATING WHETHER A PROGRAM IS OR IS NOT SELF-STARTING. AN EXAMPLE OF XFR IS:

```
XFR<CR>          ;REQUEST CURRENT TRANSFER ADDRESS.
000001 000050    ;000001 IS THE CURRENT XFR ADDRESS, 000050 IS
                  ;THE NEW XFR ADDRESS ENTERED BY THE USER.
```

3.2.6 SAVE COMMAND

THE SAVE COMMAND WRITES THE CONTENTS OF THE PROGRAM BUFFER AREA OF THE UTILITY PROGRAM AS A CORE IMAGE CONTIGUOUS FILE. THE TRANSFER STARTS AT THE BEGINNING OF THE BUFFER AND ENDS AT THE WORD BEFORE THE HICORE VALUE.

THE ONLY CURRENT USE OF THE SAVE COMMAND IS TO PLACE A CORE IMAGE OF THE XSDP+ MONITOR ON CASSETTE AND MAGTAPE. THE FORMAT OF THE COMMAND IS: SAVE DDN:FILNAM.SAV<CR>

IF THE DDN: IS OMITTED, THE FILE WILL BE STORED ON THE SYSTEM DEVICE.

3.2.7 MOD COMMAND

ONCE A PROGRAM IS LOADED WITH THE LOAD COMMAND IT CAN BE PATCHED BY THE MOD COMMAND.

THE FORMAT OF THIS COMMAND IS: MOD ADDRESS<CR>

THE UTILITY PRINTS THE ADDRESS AND ITS CURRENT CONTENTS. THE USER MAY TYPE IN AN OCTAL NUMBER AND A TERMINATOR, OR JUST A TERMINATOR.

IF A NUMBER IS TYPED, IT IS USED AS THE NEW CONTENT OF ADDRESS.

THE TERMINATOR CAN BE EITHER A CARRIAGE RETURN OR A LINE FEED. A CARRIAGE RETURN TAKES THE PROGRAM BACK TO COMMAND MODE, WHEREAS A LINE FEED CAUSES THE NEXT WORD (ADR+2) TO BE OPENED FOR MODIFICATION. FOR EXAMPLE:

```
*MOD 50
000050 000005 3<LF>
000052 012737 4<LF>
000054 000340 5<CR>
*MOD 50
000050 000003 <LF>
000052 000004 <CR>
```

ANY LOCATION WITHIN THE LOCORE/HICORE LIMITS CAN BE MODIFIED WITH THIS COMMAND.

3.2.8 CORE COMMAND

THE CORE COMMAND CAUSES THE LOCORE/HICORE LIMITS OF THE PROGRAM BUFFER IN THE UTILITY TO BE TYPED. THE FORMAT OF THE COMMAND IS: CORE<CR>

FOR EXAMPLE:

```
*CORE<CR>
000000,014776      LEFT NUMBER IS THE LOWER CORE LIMIT,
                   RIGHT NUMBER IS THE UPPER CORE LIMIT.
```

3.2.9 LOCORE COMMAND

THE LOCORE COMMAND IS USED TO CHANGE THE LOWER LIMIT OF THE PROGRAM RELATIVE TO THE PROGRAM BUFFER IN THE UTILITY. THE FORMAT OF THE COMMAND IS: LOCORE ADR<CR>. ADR IS THE NEW LOW CORE VALUE.

3.2.10 HICORE COMMAND

THE HICORE COMMAND IS USED TO CHANGE THE UPPER LIMIT OF THE PROGRAM RELATIVE TO THE PROGRAM BUFFER. THE FORMAT OF THE COMMAND IS: HICORE ADR<CR>. ADR IS THE NEW HIGH CORE VALUE.

3.2.11 DELETE COMMAND

THE DELETE COMMAND CAUSES A FILE TO BE DELETED FROM THE SPECIFIED DEVICE. THE FORMAT OF THE COMMAND IS: DEL DDN:FILNAM,EXT<CR>. THE DDN: MUST BE SPECIFIED. WILDCARDS ARE ALLOWED.

3.2.12 ZERO COMMAND

THE ZERO COMMAND INITIALIZES THE DEVICE TO XXDP+ FORMAT. THIS CAUSES ALL FILE INFORMATION TO BE REMOVED FROM THE DIRECTORY. THE FORMAT OF THE COMMAND IS: ZERO DDN:<CR>. THE DDN: MUST BE SPECIFIED.

IF THE SPECIFIED DEVICE IS THE SYSTEM DEVICE, A DIALOGUE WITH THE OPERATOR WILL OCCUR. THIS DISCUSSION WARNS THE OPERATOR THAT AN ADDITIONAL READ/WRITE DRIVER MAY BE NEEDED. A REQUEST TO CONTINUE? IS GIVEN. IF THE OPERATOR DECIDES ANOTHER DRIVER IS NOT NEEDED, HE CAN ENTER A Y AND THE ZERO FUNCTION WILL PROCEED. HOWEVER, IF THE OPERATOR THINKS ANOTHER DRIVER IS NEEDED, HE CAN ENTER A N AND THE COMMAND MODE WILL BE REENTERED. THE DRIVER COMMAND CAN BE USED TO OBTAIN ANOTHER DRIVER. THE ZERO COMMAND CAN THEN BE ISSUED. THE REASON FOR THE ADDITIONAL DEVICE DRIVER IS GIVEN NEXT.

ASSUME THE USER IS USING DKK AS THE SYSTEM DEVICE. IF HE WANTS TO ZERO A DECTAPE, HE COULD TYPE ZERO DTP1. THIS COMMAND WOULD CAUSE THE DRIVER FOR DTP TO BE LOADED, AND THE ZERO FUNCTION WOULD BE PERFORMED. HOWEVER, IF HE WANTS TO ZERO A SCRATCH RK05 PACK, AND HE HAS ONLY ONE RK05 DRIVE, HE WOULD TYPE ZERO DKB1. THE UTILITY PROGRAM WOULD RECOGNIZE THE REQUEST AS A REQUEST TO ZERO THE SYSTEM DEVICE AND WOULD ENTER THE DIALOGUE WITH THE USER. THE USER COULD REQUEST THAT THE ZERO FUNCTION NOT CONTINUE. AT THIS POINT, THE USER WOULD USE THE DRIVER COMMAND TO LOAD THE DECTAPE DRIVER. HE WOULD THEN EXCHANGE HIS SYSTEM RK05 PACK FOR A SCRATCH PACK AND WOULD REPEAT HIS REQUEST FOR A ZERO OF DKB. THIS TIME HE WOULD STATE THAT THE INIT SHOULD CONTINUE. WHEN THE INIT WAS COMPLETE, HE WOULD BUILD A NEW RK05 SYSTEM FROM THE DECTAPE. AFTER THE NEW RK05 PACK WAS BUILT, HE WOULD REPLACE THE SYSTEM RK05 PACK ON THE DRIVE. THE SYSTEM PACK ITSELF MUST NEVER BE INITIALIZED BECAUSE DEVICE DRIVERS ARE LOADED FROM THAT PACK. THE FOLLOWING EXAMPLE ILLUSTRATES THIS DIALOGUE WITH THE OPERATOR:

```
*ZERO DKB1
YOU MAY NEED ADDITIONAL DRIVER
CONTINUE? (Y OR N) N
*DRIVER DTP1
*ZERO DKB1
YOU MAY NEED ADDITIONAL DRIVER
CONTINUE? (Y OR N) Y
.
```


NOTE: BEFORE ENTERING Y TO CONTINUE, THE USER PLACES A SCRATCH PACK ON THE DRIVE. FILES FROM DTB WILL BE TRANSFERRED TO THE SCRATCH PACK.

3.2.13 BOOT COMMAND

THE BOOT COMMAND CAUSES BLOCK 0 OF DDN TO BE LOADED INTO MEMORY, STARTING AT LOCATION 000000. BLOCK 0 IS ASSUMED TO HAVE A BOOT LOADER. THE PROGRAM THEN JUMPS TO LOCATION 000000 TO START THE BOOT LOADER. THE FORMAT OF THE COMMAND IS: BOOT DDN<CR>. IF THE DDN IS NOT SPECIFIED, THE SYSTEM DEVICE WILL BE BOOTED.

3.2.14 SAVM COMMAND

THE SAVM COMMAND CAUSES THE FIRST 4K OF THE BUFFER AREA IN THE UTILITY PROGRAM TO BE WRITTEN AS A CORE IMAGE. THIS COMMAND IS USED TO WRITE THE XXDP+ MONITOR ON THE DEVICE AS A CORE IMAGE THAT IS BOOTABLE. THE FORMAT OF THE COMMAND IS: SAVM DDN<CR>.

THIS COMMAND IS ONLY VALID FOR RANDOM-ACCESS DEVICES. THE DDN MUST BE SPECIFIED. FOR EXAMPLE:

```
*LOAD DK1;DKDP,BIN          ;LOAD DKDP+ MONITOR.
*SAVM DK1                   ;SAVE IT AS CORE IMAGE ON DK1
```

NOTE: SAVM DOES NOT CAUSE A DIRECTORY ENTRY.

THE SAVM COMMAND ALSO WRITES THE FIRST 256(10) WORDS OF THE BUFFER INTO BLOCK 0 OF THE DEVICE. THIS IS THE BOOT LOADER.

3.2.15 REN COMMAND

THE REN COMMAND CHANGES THE NAME OF A FILE ON A MEDIUM. THE FORMAT OF THE COMMAND IS: REN DDN1NEWNAM,EXT=DDN1OLDNAM,EXT.

IF THE DEV1 IS NOT GIVEN, THE SYSTEM DEVICE WILL BE USED. WILDCARDS ARE ALLOWED. THE DATE IS NOT CHANGED.

3.2.16 DRIVER COMMAND

THE DRIVER COMMAND IS USED TO LOAD DEVICE DRIVERS INTO MEMORY. THIS COMMAND IS NOT ORDINARILY REQUIRED, BECAUSE DRIVERS ARE LOADED AS PART OF THE EXECUTION OF THE OTHER UPDATE COMMANDS. FOR EXAMPLE, THE COMMAND DDP DDN1 CAUSES THE DRIVER FOR DDN TO BE LOADED AND THE DIRECTORY OF THAT DEVICE TO BE PRINTED. HOWEVER, THE ZERO COMMAND CREATES A SITUATION IN WHICH THE USER MAY NEED TO HAVE ANOTHER DRIVER LOADED INTO MEMORY. SEE SECTION 3.2.1.2.

THE FORMAT OF THE DRIVER COMMAND IS: DRIVER DDN1 DDN1.

3.2.17 PIP COMMAND

THE PIP COMMAND IS USED TO TRANSFER FILES FROM ONE MEDIUM TO ANOTHER MEDIUM. FILE DATA IS NOT CHECKED FOR FORMAT OR CHECKSUMS. THE OUTPUT FILE IS GIVEN THE DATE OF THE INPUT FILE. THE FORMAT OF THE COMMAND IS: PIP DDN1FILNAM,EXT=DDN2FILNAM,EXT<CR>.

THE FILE NAMES FOR THE TWO DEVICES CAN BE DIFFERENT. IF DDN IS OMITTED, THE SYSTEM DEVICE WILL BE USED. WILDCARDS ARE ALLOWED. EXAMPLES OF THIS COMMAND FOLLOW:

```
PIP PPI=PR1          (COPIES PAPER TAPE)
PIP DK1;ARC,BIN=PR1   PAPER TAPE TO DISK
PIP PPI=ABC,BIN       DISK TO PAPER TAPE PUNCH
PIP DX1;0=00,BIN      TRANSFERS ALL BIN FILES TO DX1.
```

THE USER SHOULD MAKE SURE THAT THE OUTPUT FILE NAME DOES NOT ALREADY EXIST IN THE OUTPUT DEVICE DIRECTORY.

BINARY FILES THAT HAVE BEEN PIPED TO A XXDP+ DEVICE SHOULD BE LOADED IMMEDIATELY VIA THE LOAD COMMAND TO INSURE THAT NO ERRORS HAVE OCCURRED DURING THE PIP COMMAND. ASCII FILES THAT HAVE BEEN PIPED CAN BE PRINTED VIA THE TYPE OR PRINT COMMANDS.

3.2.18 READ COMMAND

THE READ COMMAND CAN BE USED TO TEST FOR DEVICE ERRORS BY TRANSFERRING FILES FROM A MEDIUM. THE INFORMATION OBTAINED FROM THE FILES IS NOT RETAINED. THE FORMAT OF THE COMMAND IS READ DDN1FILNAM,EXT<CR>. IF DDN1 IS NOT GIVEN, THE SYSTEM DEVICE WILL BE USED. WILDCARDS MAY BE USED.

3.2.19 EOT COMMAND

THE EOT COMMAND IS PROVIDED AS A MEANS OF PLACING AN END-OF-TAPE MARK OR SENTINEL FILE AT A SELECTED SPOT ON MAGTAPE OR CARSTTE. APPLICATIONS OF THIS COMMAND INCLUDE REPLACING AN EOT MARK WHEN IT HAS BEEN ACCIDENTALLY DESTROYED, OR WHEN THE USER WISHES TO DELETE FILES AT THE END OF THE MEDIUM, AND STILL BE ABLE TO USE THE SPACE TAKEN UP BY THOSE DELETED FILES.

IF THE OPERATOR RESPONDS "F(ILE)", THEN ANY DEVICE TYPE IS LEGAL AND THE UTILITY SIMPLY DOES THE EQUIVALENT OF A PIP DDN10,00DDN10,0. THE OUTPUT AND INPUT MUST BE DIFFERENT UNITS.

3.3 COMMAND DESCRIPTIONS - UPD1

THE FOLLOWING COMMANDS ARE AVAILABLE IN UPD1 (THE FUNCTION AND FORMAT OF THESE IS IDENTICAL TO THE UPD2 COMMANDS ABOVE):

```
CLR  LOAD  LOCORE
XFR  DUMP  DEL
MOD  CORE  BOOT
HICORE
```

3.4- UPD1/UPD2 ERRORS

? INVALID DEVICE INVALID DEVICE SPECIFIED FOR COMMAND GIVEN.

? INVALID ADDRESS INVALID ADDRESS. MUST BE EVEN AND WITHIN EXISTING LOCORE AND HICORE LIMITS.

? INVALID NAME INVALID FILE NAME. NO SPECIAL CHARACTERS ALLOWED. 1 THROUGH 2, AND 8 THROUGH 9 ARE ONLY VALID CHARACTERS. ALSO OCCURS IF WILD CHARACTER CONSTRUCTION FILENAMES ARE SPECIFIED TO A COMMAND THAT DOES NOT ALLOW IT.

? NON-EXISTENT FILE NON-EXISTENT FILE. FILE DOES NOT EXIST IN DEVICE DIRECTORY.

? DELETE OLD FILE DELETE OLD FILE BEFORE GIVING COMMAND THAT WOULD CREATE FILE WITH SAME NAME.

? RD/WT DEV ERR DEVICE ERROR ON EITHER INPUT OR OUTPUT DEVICE. CHECK THAT OUTPUT DEVICE IS WRITE-ENABLED.

? CHECKSUM ERROR CHECKSUM ERROR DURING LOAD COMMAND.

? END-OF-MEDIUM END OF MEDIUM. OCCURS DURING INPUT OPERATIONS WHEN THE PROGRAM ATTEMPTS TO INPUT AND THE FILE IS AT AN END. SERIOUS PROBLEM. FILE IN STORAGE IS PROBABLY WIPED OUT.

? PROGRAM OVERFLOW PROGRAM TOO LARGE TO LOAD WITHIN EXISTING BUFFER SPACE.

? INVALID COMMAND THE COMMAND ENTERED WAS NOT RECOGNIZED BY THE UTILITY PROGRAMS.

? "DO" FILE MUST BE ON SYSTEM DEVICE. THE COMMAND FILE FOR THE DO COMMAND MUST BE ON THE SYSTEM OR LOAD DEVICE.

? LOGICAL DEVICE NOT ASSIGNED A COMMAND USED A LOGICAL DEVICE MNEMONIC THAT HAD NOT BEEN ASSIGNED TO A PHYSICAL DEVICE MNEMONIC VIA THE ASG COMMAND.

? NO DEVICE DEFAULTS ALLOWED THE DEVICE MNEMONIC IS MISSING FOR A COMMAND THAT REQUIRES IT.

3.5 COMMAND SUMMARY

FOR A SUMMARY OF UPD1 AND UPD2 COMMANDS, SEE APPENDIX A (HELP.TXT).

CHAPTER 4

XTECO - XXDP+ TEXT EDITOR

4.1 INTRODUCTION

THE XTECO - XXDP+ TEXT EDITOR PROGRAM ENABLES THE USER OF XXDP+ TO CREATE AND EDIT ASCII TEXT FILES. ALL EDITING CAN BE DONE BY USING A FEW SIMPLE COMMANDS.

XTECO IS A CHARACTER ORIENTED EDITOR. ONE OR MORE CHARACTERS IN A LINE CAN BE MODIFIED WITHOUT RETYPING THE REST OF THE LINE. XTECO DOES NOT REQUIRE THAT LINE NUMBERS BE PART OF THE TEXT.

THE INPUT FILE FOR A GIVEN EDITING OPERATION IS THE FILE TO WHICH THE USER WISHES TO MAKE CHANGES. IF THE USER IS USING XTECO TO CREATE A NEW FILE, THERE IS NO INPUT FILE. THE OUTPUT FILE IS EITHER THE NEWLY CREATED FILE, OR THE EDITED VERSION OF THE INPUT FILE.

IN GENERAL, THE EDITING PROCESS PROCEEDS AS FOLLOWS. THE USER SPECIFIES THE FILE HE WISHES TO EDIT, AND THEN A BLOCK OF TEXT IS READ INTO CORE. THE USER MODIFIES THE TEXT BY USING THE VARIOUS EDITING COMMANDS. HE THEN APPENDS ADDITIONAL BLOCKS OF TEXT AND EDITS THEM UNTIL THE ENTIRE FILE HAS BEEN EDITED. HE NEXT OUTPUTS THE EDITED FILE AND CLOSES IT.

THE XTECO PROGRAM SHARES MEMORY WITH THE XXDP+ MONITOR AND USES CERTAIN FUNCTIONS MADE AVAILABLE BY THE MONITOR. THE EXIT COMMAND IS USED TO RETURN TO THE MONITOR.

XTECO DOES NOT CONTAIN READ/WRITE DRIVERS FOR DEVICES. THESE DRIVERS ARE RESIDENT ON THE SYSTEM DEVICE AS SYS FILES. THEY ARE TRANSFERRED TO MEMORY AS THEY ARE NEEDED. AS A RESULT, XTECO WILL RUN IN BK MEMORY.

XTECO - XXDP+ TEXT EDITOR

Page 4-2

SEC 0032

4.2 XTECO COMMAND DESCRIPTION

THE PROMPT FOR THE XTECO COMMAND MODE IS THE # CHARACTER. THE XTECO PROGRAM PROVIDES SEVERAL OF THE COMMANDS AVAILABLE UNDER THE UPDATE UTILITY PROGRAMS, IN ADDITION TO THOSE COMMANDS PROVIDED FOR EDITING PURPOSES.

XTECO COMMANDS ARE OF TWO TYPES: NON-EDIT AND EDIT.

THE NON-EDIT COMMANDS ARE:

DIR	UPDATE EQUIVALENT
TYPE	UPDATE EQUIVALENT
PRINT	UPDATE EQUIVALENT
<CR>	CARRIAGE RETURN IS THE NON-EDIT TYPE COMMAND STRING TERMINATOR.
EXIT	UPDATE EQUIVALENT

THE EDIT COMMANDS ARE:

TEXT	XTECO UNIQUE
EDIT	XTECO UNIQUE
TECO	XTECO UNIQUE
<CTRL-Z>	CONTROL-Z IS THE EDIT TYPE COMMAND-STRING TERMINATOR
L	USED TO MOVE POINTER ONE OR MORE LINES
C	USED TO MOVE POINTER ONE OR MORE CHARACTERS
J	USED TO MOVE POINTER TO BEGINNING OF TEXT IN CORE.
ZJ	USED TO MOVE POINTER TO END OF TEXT IN CORE.
S	USED TO SEARCH FOR A CHARACTER SEQUENCE IN TEXT IN CORE
N	USED TO SEARCH CORE AND REMAINDER OF INPUT FILE FOR A SPECIFIED CHARACTER SEQUENCE.

T USED TO TYPE ONE OR MORE TEXT LINES.
 D USED TO DELETE ONE OR MORE CHARACTERS.
 K USED TO DELETE (KILL) ONE OR MORE TEXT LINES.
 I USED TO INSERT ASCII TEXT INTO THE TEXT BUFFER.
 A USED TO APPEND ONE OR MORE TEXT BLOCKS TO TEXT BUFFER.
 EX OUTPUTS EDITED FILE TO OUTPUT DEVICE AND CLOSSES OUTPUT.
 <ALT> ECHOES A #. USED TO TERMINATE AN EDIT COMMAND
 <ALT><ALT> ECHOES 2 #. USED TO TERMINATE LAST EDIT COMMAND AND TO CAUSE EXECUTION OF ENTIRE COMMAND STRING.

NOTE: ALT MAY BE ESC ON SOME TERMINALS.

THE USER SHOULD BE AWARE OF THE USE OF THE FOLLOWING SPECIAL CHARACTERS:

CTRL-C USED TO EXIT OUT OF ANY COMMAND AND RETURN TO COMMAND MODE. WILL CAUSE AN OPEN OUTPUT FILE TO BE CLOSED. THE USER MUST BE CAREFUL NOT TO TYPE CTRL-C, UNLESS HE WISHES TO ABORT HIS OPERATION. THIS IS SPECIALLY TRUE WHEN EDITING A FILE, AS ALL WORK WILL BE WASTED.
 CTRL-O USED TO STOP PRINTING ON THE CONSOLE TERMINAL, AS WHEN TYPING MULTIPLE LINES OF TEXT WHEN EDITING A FILE.
 CTRL-U USED TO EMPTY OUT CONTENTS OF KEYBOARD BUFFER, AS WHEN THE USER WISHES TO START TYPING HIS COMMAND SEQUENCE ALL OVER AGAIN.
 RUBOUT USED TO REMOVE ONE OR MORE CHARACTERS TYPED FROM COMMAND OR TEXT STRING. ONE DEPRESSION OF THE RUBOUT KEY REMOVES DELETE ONE CHARACTER.

4.2.1 TEXT, EDIT, AND TECO COMMANDS

TEXT, EDIT, AND TECO COMMANDS ARE THE BASIC COMMANDS PROVIDED TO CREATE OR EDIT AN ASCII TEXT FILE.

THE TEXT COMMAND IS USED WHEN THE USER WISHES TO CREATE A NEW TEXT FILE. THE TEXT COMMAND DOES NOT REQUIRE AN INPUT FILE, ONLY AN OUTPUT FILE. ALL EDITING COMMANDS ARE AVAILABLE WITH THE EXCEPTION OF THE A (APPEND) COMMAND WHICH BECOMES A NO-OP COMMAND WHEN NO INPUT FILE EXISTS.

THE EDIT COMMAND IS THE GENERAL PURPOSE COMMAND FOR EDITING AN EXISTING TEXT FILE. IT PERMITS THE USER TO EDIT AN INPUT FILE IN ONE TYPE OF DEVICE AND TO OUTPUT THE EDITED FILE TO A DIFFERENT TYPE DEVICE. ALL EDITING COMMANDS ARE AVAILABLE WHEN UNDER THE EDIT COMMAND.

THE TECO COMMAND IS A SPECIALIZED VERSION OF THE EDIT COMMAND. UNDER THE TECO COMMAND THE INPUT AND OUTPUT DEVICE/DRIVE MUST BE THE SAME (IT ASSUMES THEY ARE THE SAME), AND MUST BE RANDOM ACCESS TYPE DEVICES (DISK, DECTAPE). THE EDITED OUTPUT FILE TAKES ITS NAME FROM THE NAME AND EXTENSION OF THE INPUT FILE, AND THE INPUT FILE IS RENAMED TO A BAK EXTENSION (FOR BACKUP). ALL EDITING COMMANDS ARE AVAILABLE.

INDIVIDUAL COMMAND DESCRIPTIONS FOLLOW.

4.2.1.1 TEXT COMMAND

THE TEXT COMMAND IS USED TO CREATE A NEW TEXT FILE. THE FORMAT IS:

TEXT DDN:FILNAM.FXT<CR>

WHERE DDN: IS ANY DIRECTORY DEVICE. IF IT IS OMITTED, THE SYSTEM DEVICE IS USED.

THE PROGRAM WILL TYPE:

MAKE OUTPUT READY. TYPE <CR> WHEN READY

INSURE THAT THE OUTPUT DEVICE IS READY AND WRITE-ENABLED. PRESS THE CR KEY ON THE CONSOLE TERMINAL WHEN READY TO PROCEED. THE PROGRAM IS NOW IN EDIT MODE, AND ONLY EDITING TYPE COMMANDS ARE VALID. THE PROGRAM PROMPTS THE USER BY TYPING AN APOSTROPHE (').

THE USER CAN AT THIS POINT TYPE AND EDIT HIS TEXT. A CTRL Z ^{Ex alt} IS USED TO RETURN TO XTECO COMMAND MODE AND WRITE THE NEW TEXT AS A FILE ON THE MEDIUM.

Do not use CTRL Z to exit.

4.2.1.2 EDIT COMMAND

THE EDIT COMMAND PERMITS THE USER TO EDIT A TEXT FILE FROM A SPECIFIED INPUT DEVICE, AND TO OUTPUT THE EDITED TEXT FILE TO A SPECIFIED OUTPUT DEVICE. THE COMMAND FORMAT IS:

EDIT DDNIFILNAM,EXT=DDNIFILNAM,EXT<CR>

THE INPUT AND OUTPUT DEVICES MUST BE DIRECTORY DEVICES. IF THEY ARE OMITTED, THE SYSTEM DEVICE IS USED. FOR MAGTAPE OR CASSETTE, THE INPUT DEVICE DRIVE MUST BE DIFFERENT FROM THE DRIVE ASSIGNED TO THE OUTPUT. IF THE USER WISHES TO EDIT A FILE RESIDING ON PAPER TAPE, THE TAPE MUST FIRST BE TRANSFERRED TO A DIRECTORY DEVICE BY MEANS OF THE PIP COMMAND OF THE UPDATE PROGRAMS, AND THEN EDITED AS DESCRIBED IN THIS DOCUMENT. ONCE EDITED, THE FILE MAY AGAIN BE TRANSFERRED TO PAPER TAPE BY MEANS OF THE PIP COMMAND.

THE PROGRAM WILL TYPE:

MAKE OUTPUT READY. TYPE <CR> WHEN READY

INSURE THAT THE OUTPUT DEVICE IS READY AND WRITE ENABLED. PRESS THE CR KEY ON THE CONSOLE TERMINAL WHEN READY TO PROCEED. THE PROGRAM IS NOW IN EDIT MODE, AND ONLY EDITING TYPE COMMANDS ARE VALID. THE PROGRAM PROMPTS THE USER BY TYPING AN APOSTROPHE (').

THE USER CAN AT THIS POINT TYPE AND EDIT HIS TEXT. A CTRL-Z IS USED TO RETURN TO XTECO COMMAND MODE AND WRITE THE NEW TEXT AS A FILE ON THE MEDIUM.

4.2.2 TECO COMMAND

THE TECO COMMAND IS A SPECIALIZED, SHORT HAND VERSION OF THE EDIT COMMAND. WHEN USING THE TECO COMMAND THE INPUT DEVICE/DRIVE MUST BE THE SAME AS FOR OUTPUT. IN ADDITION, THE COMMAND IS RESERVED FOR USE ONLY WITH RANDOM ACCESS DEVICES. THE COMMAND FORMAT IS:

TECO DDNIFILNAM,EXT<CR>

WHERE DDN: IS ANY RANDOM ACCESS DEVICE. IF DDN: IS OMITTED, THE SYSTEM DEVICE IS USED.

IT IS IMPORTANT THAT THE USER BE AWARE OF THE MECHANICS INVOLVED IN THE OPERATION OF THE TECO COMMAND. THE SEQUENCE IS AS FOLLOWS:

1. OPEN INPUT FILE
2. OPEN OUTPUT FILE, AND ASSIGN IT A .TMP EXTENSION
3. EDIT OPERATIONS ARE PERFORMED
4. EDITING DONE, OUTPUT EDITED FILE TO .TMP FILE.
5. CLOSE THE .TMP FILE.
6. RENAME THE .TMP FILE TO SAME NAME AND EXTENSION AS THE INPUT FILE.
7. RENAME THE INPUT FILE TO A .BAK EXTENSION.

THE INPUT DEVICE MUST NOT CONTAIN A FILE WITH THE SAME NAME AS THE INPUT FILE AND .BAK EXTENSION. IT WILL BE DELETED IN THE PROCESS OF RENAMING THE INPUT FILE TO A .BAK EXTENSION.

NOTE THAT THE TECO COMMAND MUST NOT BE USED TO EDIT A FILE WHICH HAS THE EXTENSION .BAK. THE FILE MUST FIRST BE RENAMED TO ANOTHER EXTENSION.

THE PROGRAM WILL TYPE:

MAKE OUTPUT READY. TYPE <CR> WHEN READY

INSURE THAT THE OUTPUT DEVICE IS READY AND WRITE-ENABLED. PRESS THE <CR> KEY ON THE CONSOLE TERMINAL WHEN READY TO PROCEED. THE PROGRAM IS NOW IN EDIT MODE, AND ONLY EDITING TYPE COMMANDS ARE VALID. THE PROGRAM PROMPTS THE USER BY TYPING AN APOSTROPHE (').

THE USER CAN AT THIS POINT TYPE AND EDIT HIS TEXT. A CTRL-Z IS USED TO RETURN TO XTECO COMMAND MODE AND WRITE THE NEW TEXT AS A FILE ON THE MEDIUM.

4.2.3 EDITING COMMAND STRING SYNTAX

XTECO COMMANDS MAY BE GIVEN ONE AT A TIME. HOWEVER, IT IS USUALLY MORE CONVENIENT TO TYPE IN A COMMAND STRING CONTAINING SEVERAL COMMANDS THAT FORM A LOGICAL GROUP. AN EXAMPLE OF A COMMAND STRING IS SHOWN BELOW.

```
*IHEADING#TAGI#2LT00      ;INSERTS WORD HEADING, SEARCHES
                           ;FOR STRING TAGI, MOVES POINTER
                           ;FORWARD 2 LINES AND TYPES LINE
                           ;POINTED TO.
```


COMMAND STRINGS ARE FORMED BY TYPING ONE COMMAND AFTER ANOTHER, SEPARATED BY ONE ALTMODE OR ESCAPE. COMMAND STRINGS ARE TERMINATED BY TYPING TWO CONSECUTIVE ALTMODES.

EXECUTION OF THE COMMAND STRING BEGINS ONLY AFTER THE DOUBLE ALTMODE HAS BEEN TYPED. AT THAT POINT, EACH COMMAND IN THE STRING IS EXECUTED IN TURN, STARTING AT THE LEFT. WHEN ALL COMMANDS HAVE BEEN EXECUTED, XTECO PRINTS ANOTHER APOSTROPHE, INDICATING READINESS TO ACCEPT ANOTHER COMMAND.

IF SOME COMMANDS IN THE STRING CANNOT BE EXECUTED BECAUSE OF A COMMAND ERROR, EXECUTION OF THE COMMAND STRING STOPS AT THAT POINT, AND AN ERROR MESSAGE IS PRINTED. COMMANDS PRECEDING THE BAD COMMAND ARE EXECUTED. THE BAD COMMAND AND THOSE FOLLOWING IT ARE NOT EXECUTED.

4.2.4 COMMAND ARGUMENTS

THERE ARE TWO TYPES OF ARGUMENTS FOR XTECO EDITING COMMANDS. SOME COMMANDS REQUIRE NUMERIC ARGUMENTS AND OTHER COMMANDS REQUIRE ALPHA-NUMERIC (TEXT) ARGUMENTS. NUMERIC ARGUMENTS ARE DECIMAL INTEGERS. NUMERIC ARGUMENTS ALWAYS PRECEDE THE COMMAND TO WHICH THEY APPLY. A TYPICAL EXAMPLE OF A COMMAND TAKING A NUMERIC ARGUMENT IS THE COMMAND TO DELETE THREE CHARACTERS: JD.

ALPHA-NUMERIC ARGUMENTS ARE TEXTUAL ARGUMENTS MEANT TO BE INTERPRETTED AS ASCII CODE BY XTECO. ALPHA-NUMERIC ARGUMENTS ALWAYS FOLLOW THE COMMAND TO WHICH THEY APPLY, AND THEY MUST ALWAYS BE TERMINATED BY AN ALTMODE. EXAMPLES OF ALPHA-NUMERIC ARGUMENTS ARE (1) TEXT TO BE INSERTED, AND (2) CHARACTER STRINGS TO BE SEARCHED FOR.

EXAMPLE:

*ISOMETHINGS\$,THE ARGUMENT IS SOMETHING

AS SHOWN IN THE ABOVE EXAMPLE, THE ALTMODE USED TO TERMINATE AN ALPHA-NUMERIC ARGUMENT MAY ALSO SERVE AS ONE OF THE TWO ALTMODES NECESSARY TO TERMINATE A COMMAND STRING.

4.2.5 XTECO EDIT COMMANDS

4.2.5.1 A (APPEND) COMMAND

THE A COMMAND READS IN THE NEXT BLOCK OF TEXT FROM THE INPUT DEVICE AND ADDS IT TO THE CONTENTS OF THE TEXT BUFFER IN CORE.

THE A COMMAND ACCEPTS NUMERIC ARGUMENTS. EXAMPLE: JAS8. HOWEVER, IT DOES NOT EXECUTE ANY OTHER COMMANDS FOLLOWING IT IN THE COMMAND STRING. IT IS MEANT TO BE USED SINGLY IN A COMMAND STRING. WHEN NOT ENOUGH CORE IS AVAILABLE TO SATISFY AN A COMMAND, XTECO OUTPUTS PART OF THE TEXT BUFFER ONTO THE OUTPUT DEVICE UNTIL THE REQUIREMENTS OF THE A COMMAND ARE SATISFIED.

4.2.5.2 BUFFER POINTER POSITIONING COMMANDS

SINCE XTECO IS A CHARACTER-ORIENTED EDITOR, IT IS VERY IMPORTANT THAT THE USER UNDERSTAND THE CONCEPT OF THE BUFFER POINTER. THE POSITION OF THE BUFFER POINTER DETERMINES THE EFFECT OF MANY OF THE EDITING COMMANDS. FOR EXAMPLE, INSERTION AND DELETION ALWAYS TAKES PLACE AT THE CURRENT POSITION OF THE BUFFER POINTER.

THE BUFFER IS THE CURRENT TEXT CONTENTS IN CORE, FROM THE FIRST CHARACTER, UP TO AND INCLUDING THE LAST CHARACTER.

THE BUFFER POINTER IS SIMPLY A MOVABLE POSITION INDICATOR. IT IS ALWAYS POSITIONED BETWEEN TWO CHARACTERS IN THE BUFFER, OR BEFORE THE FIRST CHARACTER IN THE BUFFER, OR AFTER THE LAST CHARACTER IN THE BUFFER. THE POINTER MAY BE MOVED FORWARD OR BACKWARD OVER ANY NUMBER OF CHARACTERS.

4.2.5.2.1 J COMMAND

THE J COMMAND MOVES THE POINTER TO THE BEGINNING OF THE BUFFER I.E., IMMEDIATELY BEFORE THE FIRST CHARACTER IN THE BUFFER.

4.2.5.2.2 ZJ COMMAND

THE ZJ COMMAND MOVES THE POINTER TO THE END OF THE BUFFER. I.E., TO POSITION FOLLOWING LAST CHARACTER IN THE BUFFER.

4.2.5.2.3 C COMMAND

THE C COMMAND MOVES THE POINTER ONE CHARACTER IN THE BUFFER. THE C COMMAND MAY BE PRECEDED BY A (DECIMAL) NUMERIC ARGUMENT. THE COMMAND NC MOVES THE POINTER FORWARD OVER N CHARACTERS. THE COMMAND -NC MOVES THE POINTER BACKWARD OVER N CHARACTERS. (THE POINTER CANNOT BE ADVANCED BEYOND THE ENDS OF THE BUFFER).

4.2.5.2.4 L COMMAND

THE L COMMAND IS USED TO ADVANCE THE BUFFER POINTER ON A LINE-BY-LINE BASIS. THE L COMMAND TAKES A NUMERIC ARGUMENT, WHICH MAY BE POSITIVE, NEGATIVE, OR ZERO, AND IS UNDERSTOOD TO BE A 1 IF OMITTED.

SUPPOSE THE BUFFER POINTER IS POSITIONED AT THE BEGINNING OF LINE B OR AT SOME POSITION WITHIN LINE B.

THE COMMAND NL, WHERE N>0, ADVANCES THE POINTER TO THE BEGINNING OF LINE B+N.

THE COMMAND =PL MOVES THE POINTER TO THE BEGINNING OF LINE N. IF THE POINTER IS ALREADY AT THE BEGINNING, NOTHING HAPPENS.

THE COMMAND =NL MOVES THE POINTER BACK TO THE BEGINNING OF LINE N-1.

NOTE

EXECUTION OF THE A (APPEND) COMMAND DOES NOT CHANGE THE POSITION OF THE BUFFER POINTER.

4.2.5.3 TEXT TYPE-OUT COMMANDS

4.2.5.3.1 T COMMAND

VARIOUS PARTS OF THE TEXT IN THE BUFFER CAN BE TYPED OUT FOR EXAMINATION BY USE OF THE T COMMAND. JUST WHAT IS TYPED OUT DEPENDS ON THE POSITION OF THE BUFFER POINTER AND THE ARGUMENT GIVEN. THE T COMMAND NEVER MOVES THE BUFFER POINTER.

THE T COMMAND TYPES OUT EVERYTHING FROM THE BUFFER POINTER THROUGH THE NEXT LINE FEED. THUS, IF THE POINTER IS AT THE BEGINNING OF A LINE, THE T COMMAND CAUSES THAT LINE TO BE TYPED OUT. IF THE POINTER IS IN THE MIDDLE OF A LINE, T CAUSES THE PORTION OF THE LINE FOLLOWING THE POINTER TO BE TYPED.

THE COMMAND NT (N>0) IS USED TO TYPE OUT N LINES I.E., EVERYTHING FROM THE BUFFER POINTER THROUGH THE NTH LINE FEED FOLLOWING IT.

THE USER, ESPECIALLY ONE NEW TO XTECO, SHOULD USE THE T COMMAND OFTEN, TO MAKE SURE THE BUFFER POINTER IS WHERE HE THINKS IT IS.

DURING EXECUTION OF ANY T COMMAND, THE USER MAY STOP THE TERMINAL OUTPUT BY TYPING THE CTRL-O CHARACTER. THE PRINTING STOPS AND EXECUTION OF THE REMAINDER OF THE COMMAND STRING IS ABORTED. THEREFORE, LONG TYPEOUTS SHOULD BE RESTRICTED TO SINGLE COMMAND, COMMAND STRINGS.

4.2.5.4 DELETION COMMANDS

4.2.5.4.1 D COMMAND

INDIVIDUAL CHARACTERS ARE DELETED BY USING THE D COMMAND. THE COMMAND D DELETES THE CHARACTER IMMEDIATELY FOLLOWING THE BUFFER POINTER. THE COMMAND ND, WHERE N>0 DELETES THE N CHARACTERS IMMEDIATELY FOLLOWING THE POINTER.

4.2.5.4.2 K COMMAND

LINEs ARE DELETED BY USING THE K COMMAND. THE K COMMAND MAY BE PRECEDED BY A NUMERIC ARGUMENT, WHICH IS UNDERSTOOD TO BE A 1 IF OMITTED. THE COMMAND NK (N>0) DELETES EVERYTHING FROM THE CURRENT POSITION OF THE BUFFER POINTER THROUGH THE NTH LINE FEED CHARACTER FOLLOWING THE POINTER.

AT THE CONCLUSION OF A D OR K COMMAND THE BUFFER POINTER IS POSITIONED BETWEEN THE CHARACTERS WHICH PRECEDE AND FOLLOW THE DELETION.

4.2.5.5 INSERTION COMMAND

THE ONLY INSERTION COMMAND IS THE I COMMAND. THE ASCII TEXT THAT IS TO BE INSERTED INTO THE BUFFER IS TYPED IMMEDIATELY AFTER THE LETTER I. THE TEXT TO BE INSERTED IS TERMINATED BY AN ALTMODE.

ANY ASCII CHARACTER EXCEPT NULL, ALTMODE, RUBOUT, CTRL-C, CTRL-O, AND CTRL-U MAY BE INCLUDED IN THE TEXT TO BE INSERTED.

IF A CARRIAGE RETURN IS TYPED IN AN INSERTION, IT IS AUTOMATICALLY FOLLOWED BY A LINE FEED. THE TEXT TO BE INSERTED IS PLACED IN THE BUFFER AT THE POSITION OF THE BUFFER POINTER, I.E., BETWEEN THE CHARACTERS. AT THE CONCLUSION OF THE INSERTION COMMAND THE BUFFER POINTER IS POSITIONED AT THE END OF THE INSERTION.

ANY NUMBER OF LINES MAY BE INSERTED WITH A SINGLE I COMMAND. HOWEVER, IT IS RECOMMENDED THAT NO MORE THAN 18 TO 20 LINES SHOULD BE INSERTED WITH EACH I COMMAND.

4.2.5.6 OUTPUT COMMAND

THE ONLY OUTPUT COMMAND AVAILABLE WITH XTECO IS THE EX (EXIT) COMMAND. THE EX COMMAND IS USED TO CONCLUDE AN EDITING JOB WITH A MINIMUM OF EFFORT. ITS USE IS BEST SHOWN BY AN EXAMPLE:

SUPPOSE THE USER IS EDITING A 30 PAGE FILE AND SUPPOSE THE LAST ACTUAL CHANGE TO THE FILE IS MADE ON PAGE 10. AT THIS POINT THE USER GIVES THE COMMAND:

EX:8
#

THE ACTION OF XTECO IS (1) TO RAPIDLY MOVE ALL OF THE REST OF THE INPUT FILE TO THE OUTPUT FILE, (2) CLOSE THE FILE, AND (3) TO RETURN TO COMMAND MODE SO THAT THE USER MAY GIVE OTHER NON-EDIT MODE COMMANDS.

4.2.5.7 SEARCH COMMANDS

IN MANY CASES THE SIMPLEST WAY TO POSITION THE BUFFER POINTER IS BY USING A CHARACTER STRING SEARCH. A SEARCH COMMAND CAUSES XTECO TO SEARCH THROUGH THE TEXT UNTIL A SPECIFIED STRING OF CHARACTERS IS FOUND, AND THEN TO POSITION THE POINTER AT THE END OF THIS STRING. THERE ARE TWO SEARCH COMMANDS.

4.2.5.7.1 S COMMAND

THE S COMMAND IS USED TO SEARCH FOR A CHARACTER STRING WITHIN THE BUFFER. THE STRING TO BE SEARCHED FOR IS SPECIFIED AS AN ALPHA-NUMERIC ARGUMENT FOLLOWING THE S COMMAND. THIS ARGUMENT MUST BE TERMINATED BY AN ALTMODE.

EXECUTION OF THE S COMMAND BEGINS AT THE POSITION OF THE BUFFER POINTER AND CONTINUES TO THE END OF THE BUFFER. IF THE SPECIFIED STRING IS NOT FOUND AN ERROR MESSAGE IS PRINTED AND THE BUFFER POINTER IS SET TO THE POINT WHERE THE SEARCH BEGAN.

4.2.5.7.2 N COMMAND

THE N COMMAND WORKS JUST LIKE THE S COMMAND. THE DIFFERENCE IS THAT AN S COMMAND ENDS AT THE END OF THE BUFFER, WHEREAS THE N COMMAND DOES NOT. AN N SEARCH BEGINS LIKE AN S SEARCH BUT IF THE CHARACTER STRING IS NOT FOUND IN THE CURRENT BUFFER AN AUTOMATIC A (APPEND) COMMAND IS EXECUTED AND THE SEARCH CONTINUED UNTIL THE SEARCH IS SUCCESSFUL OR THE INPUT FILE EXHAUSTED.

IF THE N COMMAND FINDS THE SPECIFIED STRING THE POINTER IS POSITIONED AT THE END OF THE STRING FOUND. IF THE STRING IS NOT FOUND, AN ERROR MESSAGE IS PRINTED AND THE POINTER IS SET AT THE BEGINNING OF THE BUFFER. SINCE A GOOD PART OF THE FILE MAY ALREADY HAVE BEEN OUTPUT TO THE OUTPUT DEVICE, THE USER MAY HAVE NO OTHER CHOICE THAN TO EXIT VIA THE EX COMMAND, AND TO REOPEN THE FILE AND TRY THE N SEARCH AGAIN WITH A CHARACTER STRING THAT CAN BE FOUND.

WARNING

WHEN ATTEMPTING TO SEARCH IT IS VERY EASY TO OVERLOOK AN OCCURRENCE OF THE SEARCH STRING PRECEDING THE ONE THE USER DESIRES. FOR EXAMPLE, HE MAY WANT TO MOVE THE POINTER AFTER THE WORD "AND" BUT ERRONEOUSLY POSITION THE POINTER AFTER A PRECEDING OCCURRENCE OF A WORD LIKE "THOUSAND".

FOR THIS REASON, THE USER IS STRONGLY URGED TO EXECUTE A T COMMAND TO ASCERTAIN THE POSITION OF THE POINTER AFTER EACH SEARCH COMMAND.

4.3 XTECO ERRORS

ERROR MESSAGES GENERATED BY XTECO ARE INCLUDED IN THOSE GENERATED BY THE UPDATE PROGRAMS. REFER TO THE DESCRIPTIONS GIVEN FOR THE UPDATE PROGRAMS.

IN ADDITION, ONE ERROR MESSAGE IS GENERATED BY XTECO WHEN A SEARCH FOR A CHARACTER STRING BY EITHER THE S OR N COMMANDS FAILS. IN THAT CASE XTECO TYPES:

NOT FOUND: <ASCII STRING>

CHAPTER 5

OPERATING INSTRUCTIONS FOR SUPERVISOR DIAGNOSTICS

5.1 OPERATING INSTRUCTIONS FOR SUPERVISOR DIAGNOSTICS

5.1.1 HOW TO RUN THIS TYPE OF DIAGNOSTIC

5.1.1.1 THE FIVE STEPS OF EXECUTION

A supervisor diagnostic should be started using normal XXDP procedures.

When the diagnostic is started, the following steps will occur:

• STEP 1 •

When the diagnostic issues the prompt "DR>", you will enter a "START" command. This is not the same as the XXDP "START" command, which you already issued in response to the XXDP dot prompt. This "START" command can take a number of switches and flags (all optional) and the details of these are set forth in "5.3 DETAILS OF COMMANDS AND SYNTAX". However, in order to use the program, all you need to say is something like this:

STA/PASS;1/FLAGS;HOE

Things to note here:

1. Only the first three characters of this or any command at the
2. "DR>" level need to be typed. The "PASS" switch specifies how many passes you desire. A pass consists of running the full diagnostic against all units being tested (this will be explained shortly). One pass is specified in the above example.

OPERATING INSTRUCTIONS FOR SUPERVISOR DIAGNOSTICS

Page 5-2

SEC 0043

3. The "FLAGS" switch may specify any of a number of flags, but the main useful ones are:

LOE	Loop one error
HOE	Halt on error
IEP	Inhibit error printout

The HOE flag is specified in the above example (we'll see why shortly).

• STEP 2 •

When you have typed in a "START" command, the diagnostic will come back with the question " UNITS?" to which you should respond by typing in the number of devices you wish to test.

A word of warning here! The number of units depends on the target device of the diagnostic. For example, if the diagnostic is directed at a disk drive, then the number of units would be the number of drives to be tested. Whereas if the diagnostic was directed at the disk controller, then the number of units would be the number of controllers. The target device of a diagnostic can always be determined by inspecting the "HEADER" statement near the beginning of the source code. One of the operands of this "HEADER" statement should be the device type of the diagnostic.

• STEP 3 •

When you have typed in the number of units to be tested, the diagnostic will ask you the "hardware questions". The answers to these questions are used to build tables in core, called "hardware P-tables". One hardware P-table will be built for each unit to be tested.

There are several hardware questions and the entire series will be posed N times, where N is the number of units.

This represents a new philosophy in diagnostic engineering. Diagnostic will in the future not be written to autosize or assume standard addresses! Instead, they will ask the operator for all the information they need to test the device.

CON/FLAG&:HOE:IER=0:LOE=0

OPERATING INSTRUCTIONS FOR SUPERVISOR DIAGNOSTICS

Page 5-6

SE- 4447

This will restore the flags to their original values and resume execution at the beginning of the hardware test you were in. If the error does not recur, the execution will flow right on thru to the next error or to end of pass.

If at end of pass you want to run the diagnostic again, you have two choices:

1. START
2. RESTART

You would choose one, depending on whether you wanted to answer the hardware questions again.

The full print-out from the above dialogue might look like this:

```

BT
WHOM
ENTERFDI
O
D
D,D,O
D
D,D,O
D
D,D,O
D
D
D
D
D
D
D
D
D
D

```

AT THIS POINT THE DIAGNOSTIC IS LOOPING ON THE
ERROR WITHOUT PRINTING ANYTHING. YOU CAN SCOPE
THE ERROR UNTIL YOU HAVE LOCATED IT, THEN "C OUT

```

      TC                                     0
      DRPCON/FLAGS:NOEITER;LOE=0          D,0
      DZKXX EOP 1                          D
      DRPRESTART/PA6611                    D,0
      CHANGE SW (L) 1 N                     D,0
      -----
      -----
      -----
      -----
      -----

```


5.1.2 DETAILS OF COMMANDS AND SYNTAX

5.1.2.1 TABLE OF COMMAND VALIDITY

There are four ways of entering diagnostic command mode, and different subsets of the diag command set are available with each:

HOW ENTERED	LEGAL COMMANDS
1. Operator entered 'RUN DIAG'	START PPRINT DISPLAY FLAGS ZFLAGS
EXIT	
2. Diagnostic has finished all its requested passes	START RESTART PRINT DISPLAY FLAGS ZFLAGS
EXIT	
3. Operator interrupted the diagnostic with CTRL/C	START RESTART CONTINUE PPRINT DISPLAY FLAGS ZFLAGS
EXIT	
4. An error was encountered with the NOE flag set set	START RESTART CONTINUE PROCEED PRINT DISPLAY FLAGS ZFLAGS
EXIT	

5.1.2.2 COMMAND SYNTAX

```
*****
STA(PT)/TEST;TEST=LIST/PASS;PASS=CN;FLAG;FLAG=LIST/EOP;EOP=INCR
*****
```

The diagnostic in core is executed in accordance with the switches specified. The message " UNITS?" is printed. The START command may be issued when diagnostic command mode has been entered via one of the following: A) Operator typed "RUN DIAGNOSTIC" B) Diagnostic finished executing C) Error was encountered with MOE flag set D) Operator entered CONTROL/C.

After the operator responds to " UNITS?", the hardware dialogue is initiated. When it is completed, the questions "CHANGE SW?" is issued, and the answers, if given, become the new defaults. Therefore it is necessary to reload the program in order to return to the load defaults.

The switch arguments are as follows:

"TEST=LIST" is a sequence of decimal numbers (1:2 etc.) or ranges of decimal numbers (1-518-10 etc.) that specify the tests to be executed. The numbers are separated by colons. The numbers range from 1 to the largest test number in the diagnostic. They may be specified in any order. Tests will be executed in numerical order regardless of the order of specification. The default is to execute all tests.

"PASS=CN" is a decimal number indicating the desired number of passes. A pass is defined as the execution of the full diagnostic (all selected tests) against all units submitted. The default is non-ending execution.

"FLAG=LIST" is a sequence of elements of the form <FLAG>, <FLAG>=1, or <FLAG>=0, separated by colons, where <FLAG> has one of the following values:

MOE	Halt on error, causing command mode to be entered when an error is encountered
LOE	Loop on error, causing the diagnostic to loop continuously within the smallest defined block of coding (segment, subtest, or test) containing the error
IER	Inhibit error reporting
IBE	Inhibit basic error reports
IXE	Inhibit extended error reports
PPI	Direct all messages to a line printer
PNT	Print number of tests being executed
BOE	Bell on error
UAM	Run in unattended mode, bypassing manual intervention tests
ISR	Inhibit statistical reports
IDU	Inhibit dropping of units by diagnostic

The flags named or equated to 1 are set, those equated to 0 are cleared. A flag not specified is cleared. If the flags switch is not given all flags are cleared.

"EOP=INCR" is a decimal number indicating how often (in terms of passes) it is desired that the end of pass message be printed. The default is at the end of every pass.

```
*****
RES(START)/TEST;TEST=LIST/PASS;PASS=CN;FLAG;FLAG=LIST/EOP;EOP=INCR/UNIT;UNIT=LIST
*****
```

The diagnostic in core is executed in accordance with the switches specified. However, new p-tables are not built. Instead, the ones in core are used. The question "CHANGE SW?" is asked, and the answers, if given, become the new defaults. The command may be issued when command mode has been entered via A) Diagnostic is finished B) Halt on error C) CONTROL/C.

The switch arguments are as in the start command except:

1. "UNIT=LIST" is a sequence of logical unit numbers ranging from 0 THRU N-1 (N = number of units being tested) specifying which units are to be tested. The logical unit number designates the position of the p-table in core, according to the order in which they were built. The units specified must not have been dropped by the operator drop command. The unit-list defaults to "all that have not been dropped by operator command". The effect of the unit-list lasts until the next START (where it is automatically reset to "ALL") or the next RESTART.
2. All unspecified flag settings are unchanged.

```
*****
CON(TINUE)/PASS;PASS=CN;FLAG;FLAG=LIST
*****
```

Command mode must have been entered due to a halt on error or a CONTROL/C. The effect of the command is to go to the beginning of the test that was being executed when the halt or CONTROL/C took place. Software dialogue may optionally be reexecuted. Hardware parameters may not be changed.

The switch arguments are as in the START command except:

1. Default for PASS=CN is the unsatisfied PASS=CN from the previous START or RESTART

2. Unspecified flag settings are unchanged

```

*****
PRO(CCEED)/FLAG$(<FLAG-LIST>
*****

```

Command mode must have been entered via a halt on error. The effect of the command is to begin execution at the location following the error call. Neither hardware nor software parameters may be altered.

The switch arguments are the same as the START command except:

1. Unspecified flag settings are unchanged

```

****
EXIT
****

```

RETURN TO XXDP PROMPT MODE,

```

*****
DRO(P)/UNIT$;UNIT-LIST
*****

```

The units specified are dropped from testing until they are added back or until a START command is given. A DROP cannot be followed by a PROCFED.

There is also a "DROP" macro internal to the diagnostic, which gives the facility of auto-dropping. The duration of a program drop, however, is only until the next START or RESTART.

```

*****
ADD/UNIT$;UNIT-LIST
*****

```

The units specified are added back (they must have been previously dropped by the DROP command) to the test sequence. An ADD cannot be followed by a PROCFED.

```

*****
PRI(NT)
*****

```

All statistics tables accumulated by the diagnostic are printed. The ISP (Inhibit Statistical Reporting) flag is cleared.

```

*****
DIS(PLAY)/UNIT$(<UNIT-LIST>
*****

```

The hardware p-tables for all units under test are printed out in the

OPERATING INSTRUCTIONS FOR SUPERVISOR DIAGNOSTICS

Page 5-12

SEQ 4053

format in which they were entered. Any units that were dropped by the operator "DROP" command are so designated.

```

*****
FLAG$;
*****

```

The current settings of all flags are printed.

```

*****
ZFL(AGS)
*****

```

All flags are cleared.

5.1.3 EXTENDED P-TABLE DIALOGUE

The full capability of the hardware dialogue is revealed by the following discussion of what happens internally.

As soon as the question "UNIT\$?" is answered (with the number N, say) space in core is allocated for N p-tables. All of the p-tables are of the same format, and there is a one-to-one correspondence between the hardware parameter questions and the slots in the p-table format.

On the first trip thru the questions, all of the slots in all of the p-tables are filled. If the operator types in less than N explicit values in response to a particular question, these values are placed in the p-tables (one value going into the proper slot of each p-table beginning with the first p-table) until the string of values is exhausted. The last value that slot in the remaining p-tables.

On subsequent trips thru the questions, the same process is carried out, except that the earliest p-table not to have received an explicit value in any of its slots now assumes the role that table number one played in the first trip.

The series of questions is reissued until at least one question has received N explicit values from the operator.

In giving a string of values, commas without intervening values may be used to indicate a repetition of the last named value.

A string of values may be given as a range (6-i0 for example). If the values represent pure numerical data, this sample range translates to the string 6,7,8,9,i0 (an increment of 1). If the values are addresses, the sample range translates to the string 6,8,i0 (an increment of 2).

Now let us see how we could use these capabilities to construct a set

of p-tables. Assume that we have 64 units, and that there are three hardware parameters for each (three slots in the p-table, three hardware questions in the dialogue). Let the desired value for the first parameter be the number 75 for all 64 tables. Let the desired value for the second parameter be equal to the unit number (1,2,3,...,64) except for unit 50, which should receive the value 49. Let the desired value for the third parameter be the number 76 for the first 20 units and the number 77 for the last 44 units.

The following dialogue would accomplish this goal:

```

UNITS (D) ? 64

UNIT 1
<QUESTION 1> ? 75
<QUESTION 2> ? 1-20
<QUESTION 3> ? 76

UNIT 21
<QUESTION 1> ?
<QUESTION 2> ? 21-49,51-64
<QUESTION 3> ? 77

```

The first time the series is asked, slot one receives a 75 in all 64 tables. Slot two receives the values 1,2,3,...,20 in tables 1 thru 20 and a constant 20 in tables 21 thru 64. Slot three receives a constant 76 in all 64 tables.

The second time thru the series, tables 21 thru the end are going to be affected (note that this piece of information is printed out for the operator in the form "Unit XX" at the beginning of each series). Question 1 is responded to by a <CP>, so slot one stays a constant 75 in tables 21 thru 64, since no new explicit values are typed in. Slot two gets the values 21,22,23,...,49 in tables 21 thru 49, and gets a 49 in slot 50, and gets the values 51,52,53,...,64 in tables 51 thru 64. Slot three gets the value 77 in tables 21 thru 64.

The dialogue is terminated when the software recognizes that 64 explicit values have been given for at least on question (namely question 2).
CHQHLAR XXDP+ HELP TEXT FILE (HELP.TXT) 9-JAN-79

SEC 4455

CHAPTER 6

XXDP+ SETUP UTILITY

6.1 INTRODUCTION

Setup is a program utility that enables the operator to parameterize a supervisor diagnostic, for either XXDP+ or ACT environments, prior to the execution of the diagnostic. Setup asks the hardware and software questions. The answers to these questions are used to build P-tables. The result of the setup process, for the XXDP+ environment, is a file containing the diagnostic with appended P-tables or, for the ACT environment, a file containing the diagnostic with the ACTOP and Potables appended. The ACTOP is a special version of the supervisor for the ACT environment. The facility also exists to list all supervisor compatible diagnostics that are on any XXDP+ file structured device.

Setup occupies 5.75K words of memory directly below the 2K XXDP+ monitor. The minimum size machine this program supports is 16K which allows a maximum 7.75K diagnostic to be setup. Setup is not a standalone program, it shares memory with the monitor and uses certain functions made available by the monitor. It uses the loadable read/write drivers that reside on the system device for file access and data transfers. The drivers are loaded into memory as they are needed.

6.1.1 Program Description

Setup is loaded and started by the XXDP+ "R" command. It prints its title and revision level and asks the following question:

```
TARGET ENVIRONMENT: XX(DP) OR AC(T)?
```

Only the first two characters need to be typed. This tells the program which mode the setup process will perform in. This question is asked only once. If the operator wants to change environments he must exit and run it again. After the question is answered memory is sized to make sure at least 16K words exist. Setup relocates itself up against the monitor and prints its restart address. A brief help message is printed describing each command available.

A "*" prompt is printed when the program is ready to accept a command.

Typing CTRL-C will cause the program to return to prompt mode whenever any output to the terminal is being performed. The rubout, CTRL-S and CTRL-Q functions are supporting as described in Section 2.4.

6.1.1.1 Setup Command

The setup command is used to start the parameterization process. The format is:

```
SETUP DDN;OUTFIL,EXT=DDN;INFIL,EXT<CR>
```

Only the first two characters of the command need to be typed.

DDN is the two character device mnemonic and unit number. If this is omitted the system device will be used. The output device must be write-enabled. The program will not accept the same non-random access type device for both input and output if the unit numbers are the same. Tape drives are considered non-random access type devices.

INFIL,EXT is the name of the diagnostic the operator wishes to have setup. It must be a supervisor compatible diagnostic.

OUTFIL,EXT is the name the operator wishes to give the diagnostic after it has been setup. It is recommended that the extension be .BIN or .BIC because the monitor could not load the file otherwise.

If the output file already exists the following question is asked before the setup process begins:

```
DELETE FILE,EXT? (Y/N/CR=Y)
```

This question is asked because two files with the same name cannot reside on the same device.

If "N" is typed the setup process cannot continue, the command is aborted and control is returned to prompt mode.

If "Y" or <CR> is typed the new file is created in the following manner:

1. The new file is created and its filename is entered in the directory with a .TMP extension.
2. The old file is deleted.
3. The new file is given the extension specified in the command.

This is done to reduce the chance of wiping out the original copy of the diagnostic should an error occur.

6.1.1.1.1 XSDP+ Environment

The setup command for the XSDP+ environment causes the input file to be loaded into core. A check is made to see if P-tables already exist if so, the following question is asked:

```
CHANGE HW?
```

If a "Y" is typed or if no P-tables already exist the dialogue to build the hardware P-table is entered.

After the last question is answered or, if a "N" or <CR> was typed to the CHANGE HW question, the following question is asked:

```
CHANGE SW?
```

If a "Y" is typed the dialogue to build the software P-tables is entered.

After all the questions are answered, the diagnostic and the P-tables are dumped to the output device as one file.

This diagnostic can then be run with the XSDP+ monitor "R" command without having to answer the hardware questions each time.

6.1.1.1.2 ACT Environment

The setup command for the ACT environment causes the input file to be loaded into core. A check is made to see if the ACT version of the Supervisor (MSAC??,813) exists on the input device. Another check is made to see if P-tables already exist if so, the following question is asked:

```
CHANGE HW?
```

If a "Y" is typed the dialogue to build the hardware P-tables is entered. After the last question is answered or, if a "N" or <CR> was typed to the CHANGE HW question, the following question is asked:

```
CHANGE SW?
```

If a "Y" is typed the dialogue to build the software P-table is entered. After the last question is answered or, if a "N" or <CR> was typed to the CHANGE SW question, the HARDWARE questions are asked, they are:

```
LEI?
SW HW?
```

These two questions are always asked,

After all the questions are answered the diagnostic, the ACT version of the Supervisor and the P-tables are dumped to the output device as one file with the name specified in the setup command.

This diagnostic can then be run under the ACT11 system.

6.1.1.2 LIST Command

The LIST command is used to give a directory of the supervisor compatible type diagnostics. The format is:

LIST DDN:FILE,EXT<CR>

If DDN is omitted the system device will be used. The wildcard characters are accepted in the filename. The extension must be .BIN or .BIC. If no filename is given all files, with extensions .B17, will be checked for supervisor compatibility.

Each file is loaded into core and checked to see if the file is supervisor compatible. If so, the file's entry #, name, and creation date is printed.

6.1.1.3 EXIT Command

The EXIT command is used to return to the XXDP+ monitor. The format is:

EXIT<CR>

6.1.2 EPROPS

The following is a list of errors that may occur while running setup.

NOT ENOUGH CORE	- The minimum 16K words of memory does not exist. See Section 6.1.
NO CONTIG FILES	- Setup cannot process contiguous files. Diagnostics must have .BIN or .BIC extensions.
NOTREV	- Not up to revision. Diagnostic is not supervisor compatible.
INVDEV	- Invalid device specified in command string. See Section 6.2.1.
LODFRR	- Error occurs loading file. File is probably corrupted.
CAN'T CONT	- Cannot continue setup process. See Section

6.2.1.

SYNERR	- Command syntax is not correct. See appropriate command section.
NFXFIL	- File does not exist.

APPENDIX A

XXDP+ HELP FILES

A.1 XXDP+ MONITOR

A.1.1 XXDP+ MONITOR COMMANDS:

R FILENAME ADDR LOADS AND STARTS PROGRAM AT SPECIFIED ADDRESS (ADDRESS DEFAULTS TO XPR ADDRESS OF PROGRAM)
 L FILENAME LOAD PROGRAM
 S ADDR START PROGRAM AT SPECIFIED ADDRESS (ADDRESS DEFAULTS TO XPR ADDRESS OF PROGRAM)
 C FILENAME/GV EXECUTES CHAIN FILE (/GV GIVES OPTIONAL QUICK VERIFY MODE)
 D/L/F DIRECTORY (OPTIONALLY ON PRINTER (/L) OR IN SHORT FORM (/F))
 F SET CONSOLE FILL COUNT
 E UNIT # ENABLE ALTERNATE SYSTEM DEVICE
 H/L HELP FILE (OPTIONALLY ON PRINTER (/L))

NOTE: THE XXDP+ MONITOR CAN RUN EITHER THE OLD OR THE NEW XXDP UTILITIES, BUT THE OLD XXDP MONITOR CANNOT RUN THE NEW UTILITIES.

THE NEW MONITOR IS A 2K PROGRAM (UNLIKE THE OLD XXDP MONITOR, WHICH WAS A 1.5K PROGRAM). HOWEVER, ALL OLD DIAGNOSTICS ARE STILL SUPPORTED, REGARDLESS OF SIZE (SEE 3.7).

A.1.2 BOOT TIME QUESTIONS:

THE MONITOR WILL ASK YOU AT BOOT TIME WHETHER YOU HAVE 50 HZ AND WHETHER YOU HAVE AN LSI. THIS IS INFORMATION THAT IT CANNOT AUTOSIZE FOR AND WHICH IT MUST PASS ON TO CERTAIN NEW TYPES OF DIAGNOSTICS.

BOTH QUESTIONS DEFAULT TO "N" IF YOU TYPE A <CR>.

THE MONITOR ALSO ASKS THE DATE AT BOOT TIME. YOU CAN TAKE THE DEFAULT OF 1-JAN-74 BY TYPING <CR>.

NOTE: XXDP+ UTILITIES USE THE DATE SUPPLIED TO THE MONITOR AT BOOT

XXDP+ HELP FILES

Page A-2

TIME.

A.1.3 FNABLE COMMAND:

THE "FNABLE" COMMAND HAS BEEN UPGRADED TO HANDLE ANY DEVICE (FORMERLY HANDLED JUST CASSETTES). IF YOU ARE BOOTED FROM ONE DRIVE AND WANT THE MONITOR TO BEHAVE AS IF IT HAD BEEN BOOTED FROM ANOTHER, JUST TYPE "E UNIT # (F.G., "E 2" FOR DRIVE 2).

A.1.4 DIRECTORY UTILITY

THE SPECIAL UTILITY HUDI??,SYS IS AUTOLOADED BY THE MONITOR WHEN THE "D" COMMAND IS ISSUED BY THE OPERATOR. IT PERFORMS THE DIRECTORY FUNCTION AND OVERLAYS THE CONTENTS OF MEMORY (EXCEPT THE MONITOR).

A.2 XXDP+ UTILITIES

A.2.1 XXDP+ UPD1 UTILITY COMMANDS:

CLP CLEAR MEMORY
 XPR SET TRANSFER ADDRESS
 MOD ADDR MODIFY CORE
 LOAD DEV:FILENAME LOAD PROGRAM
 DUMP DEV:FILENAME DUMP PROGRAM
 CORE DISPLAY CORE LIMITS FOR DUMP
 HICORE ADDR SET HICORE LIMIT FOR DUMP
 LOCORE ADDR SET LOCORE LIMIT FOR DUMP
 DEL DEV:FILENAME DELETE PROGRAM
 BOOT DEV: BOOT DEVICE

NOTE: THE UPD1 UTILITY SUPPORTS ALL STANDARD XXDP DEVICES, BUT ONLY THE ABOVE COMMAND SET (FOR EXAMPLE, NOTE THAT THE "PIP" AND "START" COMMANDS ARE NO LONGER AVAILABLE).

UPD1 NEEDS TO BE USED ONLY IN CASES WHERE THERE IS NOT SUFFICIENT MEMORY TO ALLOW THE LOAD/MOD/DUMP OPERATION ON A BINARY FILE. OTHERWISE, UPD2 MAY BE USED.

IT IS A 4K PROGRAM AND IT EXECUTES IN LOW CORE (WHERE IT LOADS). IT DESTROYS THE MONITOR IMAGE IN HIGH CORE (IT USES THAT AREA AS A BUFFER). THEREFORE YOU MUST REBOOT THE MONITOR WHEN FINISHED.

THE LOAD DEVICE MUST REMAIN ONLINE THROUGHOUT EXECUTION, SINCE UPD1 USES RETRIEVABLE DEVICE DRIVERS FROM THAT MEDIUM AS IT EXECUTES.

A.2.2 XXDP+ UPD2 UTILITY COMMANDS:

CLR	CLEAR MEMORY
ZERO DEVI	ZERO DEVICE
SAVM DEVI	SAVE MONITOR TO DISK
SAVE DEV:FILENAME	SAVE MONITOR TO TAPE
XFR	SET TRANSFER ADDRESS
LOAD DEV:FILENAME	LOAD PROGRAM
DUMP DEV:FILENAME	DUMP PROGRAM
CORE	DISPLAY CORE LIMITS FOR DUMP
HICORE ADDR	SET HICORE LIMIT FOR DUMP
LOCORE ADDR	SET LOCORE LIMIT FOR DUMP
DIR DEV:FILENAME	DIRECTORY (OPTIONALLY FOR A PARTICULAR FILE)
PATCH DEV:FILENAME	PATCH DISK FILE
ASG PHDEV:LOGDEV:	ASSIGN LOGICAL NAME
READ DEV:FILENAME	READ FILE FOR VALIDITY
PIP DEV:FILENAME=DEV:FILENAME	TRANSFER FILE (THE /F SWITCH (FOR "FAST") CAUSES UPD2 TO WRITE FILES TO TAPE WITHOUT CHECKING TO SEE WHETHER THEY ARE ALREADY PRESENT, THUS POTENTIALLY DUPLICATING THE NAME)
-	WRITE END OF TAPE MARK
END DEVI	DELETE FILE
DEL DEV:FILENAME	DELETE FILE
REN DEV:FILENAME=DEV:FILENAME	RENAME FILE
DO FILENAME	EXECUTE COMMAND FILE (IT MUST BE ON SYSTEM DEVICE AND IT MUST NOT CONTAIN "EXIT" CMD)
DRIVER DEVI	LOAD R/W DRIVER INTO CORE
BOOT DEVI	ROOT SYSTEM
PRINT DEV:FILENAME	PRINT FILE (ON LPT)
TYPE DEV:FILENAME	TYPE FILE (ON TTY)
MOD ADDR	MODIFY CORE
COPY DEVI=DEVI	COPY VOLUME (NEED LIKE DEVICES)
EXIT	RETURN CONTROL TO MONITOR

NOTE: THE UPD2 UTILITY SUPPORTS ALL STANDARD XXDP DEVICES, BUT THE "START" COMMAND IS NO LONGER SUPPORTED (NECESSARY TO USE MONITOR FOR THAT).

IT IS A SW PROGRAM THAT EXECUTES IN LOW CORE (WHERE IT LOADS) AND MAKES CALLS TO THE MONITOR AS IT EXECUTES. THE EXIT COMMAND RETURNS CONTROL TO THE MONITOR.

UPD2 USES RETRIEVABLE I/O DRIVERS FROM THE SYTEM DEVICE AS IT EXECUTES, THEREFORE THAT DEVICE MUST REMAIN ONLINE DURING ITS EXECUTION.

XXDP+ HELP FILES

Page A-4

SEQ 0063

A.2.3 PIP/FILE RULES:

HERE'S WHAT HAPPENS WHEN YOU DO A "PIP" OR A "FILE" BETWEEN DISKS OR TAPES, AND THE FILE BEING TRANSFERRED IS ALREADY PRESENT ON THE OUTPUT DEVICE ("D" AND "T" STAND FOR DISK AND TAPE):

	SINGLE FILE MODE WILD CARD MODE
FILE	D: SAYS "DELETE OLD" D: AUTODELETES T: SAYS "DELETE OLD" T: AUTODELETES
PIP	D: SAYS "DELETE OLD" D: AUTODELETES T: SAYS "DELETE OLD" T: AUTODELETES
FILEF	D: SAYS "DELETE OLD" D: AUTODELETES T: DUPLICATES THE NAME T: DUPLICATES THE NAME
PIP/F	D: SAYS "DELETE OLD" D: AUTODELETES T: DUPLICATES THE NAME T: DUPLICATES THE NAME

NOTE: THE REASON THAT THE "FAST MODE COMMANDS" (THE "FILEF" COMMAND AND THE "PIP" COMMAND WITH THE "/F" SWITCH) CREATE DUPLICATE NAME ON TAPE IS THAT THE OUTPUT TAPE IS NOT REWOUND TO SEARCH FOR THE PRESENCE OF A FILE WITH THE SAME NAME AS THAT OF THE SPECIFIED OUTPUT FILE.

THE "FILE" AND "FILEF" COMMANDS, ALTHOUGH STILL SUPPORTED, HAVE BEEN OFFICIALLY REPLACED BY THE "PIP" AND "PIP/F", WHICH ARE FUNCTIONALLY IDENTICAL (ALTHOUGH NOT SYN- TACTICALLY IDENTICAL). THE "PIP" NEEDS OUTPUT FILENAME, WHICH THE "FILE" DOESN'T TAKE.

A.2.4 XXDP+ XTECO UTILITY COMMANDS:

DIR DEV:FILENAME	DIRECTORY (OPTIONALLY OF SPECIFIC FILE)
PRINT DEV:FILENAME	PRINT FILE (ON LPT)
TYPE DEV:FILENAME	TYPE FILE (ON TTY)
EDIT DEV:FILENAME=DEV:FILENAME	EDIT ASCII FILE
XTECO DEV:FILENAME	EDIT SINGLE FILE IN PLACE
TEXT DEV:FILENAME	CREATE NEW TEXT FILE
C	MOVE POINTER BY CHARACTERS
L	MOVE POINTER BY LINES
ZJ	MOVE POINTER TO START OF TEXT IN MEMORY
S	MOVE POINTER TO END OF TEXT IN MEMORY
N	SEARCH FOR CHARACTER SEQUENCE
T	SEARCH TO END OF FILE FOR SEQUENCE
I	TYPE LINES OF TEXT
D	DELETE CHARACTERS
K	DELETE LINES OF TEXT
I	INSERT TEXT
A	APPEND MORE TEXT FROM FILE INTO MEMORY
<ESC>	TERMINATE A COMMAND
<ESC><ESC>	TERMINATE LAST COMMAND AND EXECUTE ANY COMMAND

"C	RETURN TO COMMAND MODE
"U	RESTART COMMAND SEQUENCE
RUBOUT	IGNORE LAST CHARACTER
"Z	TERMINATE INPUT MODE
EXIT	RETURN CONTROL TO MONITOR

A.2.5 ZEROING A SYSTEM DEVICE:

IF YOU ATTEMPT TO ZERO THE SYSTEM LOAD DEVICE, THE UTILITY PROGRAM WILL WARN YOU TO LOAD ANOTHER DEVICE DRIVER THIS WARNING IS GIVEN BECAUSE DEVICE DRIVERS RESIDE AS .SYS FILES ON THE SYSTEM DEVICE. BEFORE YOU ZERO THE SYSTEM DEVICE, YOU MUST HAVE TWO DEVICE DRIVERS IN MEMORY: ONE FOR THE SYSTEM DEVICE AND ONE FOR THE DEVICE YOU WILL USE TO REBUILD THE SYSTEM DEVICE. THE ZERO COMMAND PROVIDES THE FIRST DRIVER. THE "DRIVER" COMMAND CAN BE USED TO OBTAIN THE SECOND DRIVER. IF BOTH DEVICES ARE OF THE SAME TYPE, THEN ONLY ONE DRIVER IS NEEDED.

A.3 MISCELLANEOUS OPERATIONS:

A.3.1 NON-STANDARD CSRI:

IF YOUR SYSTEM DEVICE HAS A NON-STANDARD CSRI, PATCH LOCATION 2H OF THE MONITOR AND LOCATION 24 OF THE READ/WRITE DRIVER TO THE CORRECT VALUE. IN PATCHING THE MONITOR, IT IS NECESSARY TO PATCH THE ".SYS" FILE AND THEN TO DO A "SAVM" TO THE DISK.

A.3.2 CHAINING UTILITIES:

THE MONITOR CHAIN COMMAND CAN BE USED TO EXECUTE THE UPD2 UTILITY AS FOLLOWS. LET THE CHAIN FILE CONTAIN THE COMMAND "R UPD2". AFTER THIS, PLACE WHATEVER UPD2 COMMANDS YOU WISH TO HAVE EXECUTED. AT THE END OF THESE, PUT THE UPD2 COMMAND "EXIT". YOU MAY THEN FOLLOW WITH ANY OTHER LEGAL MONITOR COMMANDS.

THE MONITOR WILL ONLY CHAIN FILES WHICH END WITH THE EXTENSION ".BIC", SO IT IS NECESSARY TO COPY OR RENAME YOUR "UPD2.BIN" TO UPD2.BIC" BEFORE CHAINING.

A.3.3 HOW TO MERGE XXDP+ SOFTWARE ONTO YOUR DISK:

- BOOT FROM OLD XXDP PACK
- RUN OLD UPD2
- FILE OLDEV:=NEWDEV;.SYS (THIS BRINGS ACROSS THE NEW MONITORS AND THE NEW DRIVERS AND THE DIRECTORY UTILITY MUDI??,SYS WHICH IS AUTOMATICALLY INVOKED BY THE MONITOR ON A "D" COMMAND)
- FILE OLDEV:=NEWDEV;.BIN (THIS BRINGS ACROSS THE NEW UPD2, UPD1, XTFCO, AND DXCL UTILITIES)

XXDP+ HELP FILES

Page A-6

SEC 0005

- FILE OLDEV:=NEWDEV;HELP.TXT (BRINGS ACROSS THIS FILE)
- LOAD NEWDEV;MXX??,SYS (THIS IS THE NEW MONITOR FOR YOUR SYSTEM DEVICE) THE "XX" IS THE DEVICE MNEMONIC, AS EXPLAINED BELOW
- SAVM OLDEV; (PUTS NEW MONITOR IMAGE IN BOOT AREA OF OLD PACK)
- YOU ARE STILL RUNNING THE OLD UPD2! NOW BOOT YOUR DEVICE AND YOU'LL BE RUNNING THE NEW MONITOR.

A.3.4 HOW TO MERGE YOUR XXDP TAPE ONTO AN XXDP+ TAPE:

- BOOT FROM NEW TAPE
- RUN NEW UPD2
- DELETE OLDEV;THDP.SAV
- DELETE OLDEV;THDP.SAV
- DELETE OLDEV;UPD1.BIN
- DELETE OLDEV;UPD2.BIN
- DELETE OLDEV;XTFCO.BIN
- FILE NEWDEV;OLDEV;.S

A.3.5 HOW TO BUILD XXDP+ DISK FROM SCRATCH:

- ZERO THE DISK
- LOAD MONITOR FOR THAT DISK TYPE
- DO A "SAVM" TO THAT DISK
- TRANSFER ALL DESIRED FILES TO THAT DISK

A.3.6 HOW TO BUILD XXDP+ TAPE FROM SCRATCH:

- ZERO THE TAPE
- LOAD MM MONITOR
- DO A "SAVE" OF THE MM MONITOR TO THE TAPE (EXT = "SAV")
- LOAD THE MT MONITOR
- DO A "SAVE" OF THE MT MONITOR TO THE TAPE (EXT = "SAV") F) TRANSFER DESIRED FILES TO THE TAPE

A.3.7 LOADING AN "OVERSIZE" DIAGNOSTIC:

THE XXDP+ MONITOR IS A 2K PROGRAM (XXDP WAS 1.5K). THE LOWER .5K IS "EXPENDABLE" AND IS RESTORED BY THE REST OF THE MONITOR WHEN IT IS FOUND TO BE MISSING (BY CHECKSUM). IT IS POSSIBLE TO RUN A 14.5K DIAGNOSTIC ON A 16K MACHINE. SUCH A DIAGNOSTIC, HOWEVER, SHOULD NOT BE LOADED AND STARTED BY TWO SEPARATE COMMANDS LOAD/START. THIS IS BECAUSE THE TTY I/O ROUTINES ARE IN THE LOWER .5K OF THE MONITOR AND IF THE DIAGNOSTIC OVERLAYS THAT AREA YOU WON'T BE ABLE TO TALK TO THE KEYBOARD. THEREFORE IF THE MONITOR DETECTS THAT YOU HAVE ISSUED THE "LOAD" COMMAND FOR SUCH A FILE, IT WILL TYPE THE MESSAGE "CONTINUE LOAD THEREBY DISABLING KEYBOARD" IF YOU ANSWER "YFS", IT WILL

COMPLETE THE LOAD, BUT YOU WILL HAVE TO START THE DIAGNOSTIC VIA CONSOLE SWITCHES. IF YOU ANSWER "NO", THE MONITOR RETURNS TO COMMAND MODE, AND YOU MAY ISSUE A "RUN" COMMAND FOR THAT DIAGNOSTIC (WITH AN OPTIONAL STARTING ADDRESS) AND YOU WON'T BE AFFECTED BY THE LOWER ,5K BEING TEMPORARILY OVERLAID.

A.4 XXDP+ NAMING CONVENTIONS

A.4.1 XXDP+ MONITOR AND DEVICE DRIVER NAMING CONVENTIONS:

DEVICE MNEMONIC	FILE	MONITOR DRIVER FILE	DEVICES SUPPORTED
CT		HMCT???.SYS	MDCT???.SYS TA11/TU68
DB		HMDB???.SYS	MDDB???.SYS RPA4/S/6
DT		HMDD???.SYS	MDDD???.SYS DL11/TU58
DK		HMDK???.SYS	MDDK???.SYS RK11/RK05
DL		HMDL???.SYS	MDDL???.SYS RL11/RL01
DM		HMDM???.SYS	MDDM???.SYS RK611/RK06/7
DP		HMDP???.SYS	MDDP???.SYS RP11/RPA2/3
DR		HMDR???.SYS	MDRR???.SYS RPA2/3
DS		HMDS???.SYS	MDSS???.SYS R8P3/4
DT		HMDT???.SYS	MDTT???.SYS TC11 DECTAPE
DX		HMDX???.SYS	MDXX???.SYS PX11/RXP1
DY		HMDY???.SYS	MDYY???.SYS PX211/RX02
MY		HMMY???.SYS	MDMY???.SYS TMO2/TMO3 TAPES
MT		HMMT???.SYS	MDMT???.SYS TM11 TAPES
RB		HMDR???.SYS	PPT RDR (LOW SP)
PT		HMDT???.SYS	PPT PCH (LOW SP)
PR		HMDR???.SYS	PPT RDR (HIGH SP)
PP		HMDP???.SYS	PPT PCH (HIGH SP)

NOTE: THE DEVICE MNEMONICS ARE UNCHANGED FROM PREVIOUS XXDP, BUT ALL OTHER NAMES ARE NOW DERIVED FROM THESE MNEMONICS. ALL MONITORS START WITH "HM" AND ALL DRIVERS START WITH "MD". THE ?? IN EACH FILE IS THE REV/PATCH LEVEL.

FILES WITH THE EXTENSION ".SYS" ARE BINARY FILES THAT CANNOT BE DIRECTLY EXECUTED BY THE OPERATOR. TAPE MONITORS MUST BE GIVEN THE EXTENSION ".SAV" WHEN PLACED AT THE START OF A MAGTAPE FOR BOOTING, AND ".SYS" WHEN RESIDING IN THE NORMAL FILE AREA ON EITHER TAPE OR DISK.

A.4.2 XXDP+ UTILITY NAMING CONVENTIONS:

THE FILE NAMES OF THE XXDP+ UTILITIES ARE AS FOLLOWS:

```
UPD1.BIN UPDATE UTILITY #1
UPD2.BIN UPDATE UTILITY #2
XTED.BIN TEXT EDITOR
DXCL.BIN DEC/V11 CONFIGURATOR LINKER
```


APPENDIX B

KNOWN BUGS

This appendix lists all known bugs and the corrective action to take to fix them or avoid their effects. When a bug has been permanently fixed in new software revisions, it will be noted in a revision of this section. NOTE: A "*" in a filename indicates a wildcard character.

- Supervisor-type diagnostics which are obtained from a source other than normal software distribution channels may fail to load properly when started using the "R" command. Load and dump the diagnostic using UPD2. This bug is in all revision A monitors (HM77A7.SYS).
- The monitor may fail to boot on an LSI-11 which has a clock that runs constantly. All revision A monitors (HM77A7.SYS) should be patched using UPD2. The patch is:

LOC	FROM	TO
5074	104003	12737
5076	12737	5146
5100	5146	4
5102	4	12737
5104	5037	340
5106	6	6
5364	5037	240
5366	6	240
5556	5037	240
5560	6	240
6426	5037	240
6430	6	240

- The display command in the diagnostic runtime services (MSAAAT.SYS) does not work properly when using multiple units. This will be fixed in revision B.

KNOWN BUGS

Page B-2

- The auto protect feature in the diagnostic runtime services (MSAAAT.SYS) does not work for the TUS8. Manually write protect the TUS8 load device. This will be fixed in revision B.
- "C" fails intermittently if it is typed during diagnostic initialization. This bug exists in revision A of the diagnostic runtime services (MSAAAT.SYS). It will be fixed in revision B.
- Ignore the words "REV C" in the initial printout of a supervisor-type diagnostic. This printout will not appear when revision B of the runtime services is released (MSAAAT.SYS).
- There is a bug in UPD2 (HUP2A7.SYS) which causes the COPY function to fail when invoked more than once. There are two fixes. One, simply exit prior to issuing a second COPY command and rerun UPD2. Two, halt the processor prior to issuing a second copy command, clear location 14140 and restart UPD2. This bug will be fixed in revision B of UPD2.
- There is a bug in the RLP1 and RM02,3 drivers which causes FILE and FILEF commands to fail for multiple file transfers. These drivers should be patched:

HDDLAI.SYS (RLP1)

LOC	FROM	TO
1616	5765	402
1630	1007	1015
1642	4767	414
1604	177722	16565
1666	1410	177730
1670	16565	6
1672	177730	1005
1674	6	4767
1676	1003	100

HDDRAP.SYS (RM02,3)

LOC	FROM	TO
1112	5765	402
1124	1007	1015
1136	4767	414
1160	177722	16565
1102	1410	177730
1104	16565	6
1106	177730	1005
1170	6	4767
1172	1003	100

KNOWN BUGS

Page B-3

SEC 0070

Rename the files to include the patch level (HDDLAI.SYS and HDDRAI.SYS). This bug will be permanently fixed in revision B of the drivers.

CHAPTER 3
MINI-CALIBRATION PACKAGE

Contents–Chapter 3

Section and Paragraph	Page	Section and Paragraph	Page
1 INTRODUCTION		4.3 Voltage Source Calibration and Test.....	4-3
2 ACZ MODULE CALIBRATION		4.4 Current Source Calibration and Test	4-4
2.1 General Description.....	2-1	4.5 Dynamic Tests for Voltage and Current	4-4
2.2 Set-Up Procedure.....	2-2	5 DRIVER/SENSOR REFERENCE MODULE	
2.3 Current Amplifier Offset Adjustment.....	2-3	5.1 General Description.....	5-1
2.4 Board Accuracy Checks	2-3	5.2 Set-Up and Testing Procedures.....	5-1
3 DCM MODULE CALIBRATION		APPENDIX A – ACZ MODULE	
3.1 General Description.....	3-1	APPENDIX B – DCM MODULE CALIBRATION	
3.2 Set-Up Procedure.....	3-2	B.1 Introduction	B-1
3.3 Board Calibration.....	3-4	B.2 Pretesting	B-1
3.4 Voltage Range Checks.....	3-4	B.3 Calibration.....	B-2
3.5 Current Range Check.....	3-7	B.4 Measurement.....	B-2
4 DCS MODULE CALIBRATION		B.5 Register Access Definitions	B-4
4.1 General Description.....	4-1	B.6 Definition of Terms	B-5
4.2 Set-Up Procedure.....	4-2		

Introduction - Section 1

SCOPE

This Mini-Calibration Package contains the necessary tools and diagnostic aids to enable the field service engineering force and GenRad users* of 2270 systems to completely test and calibrate the ACZ, DCS, DCM and REF Modules contained in the system using a minimum amount of special tools and test equipment.

This is a module level calibration package only.

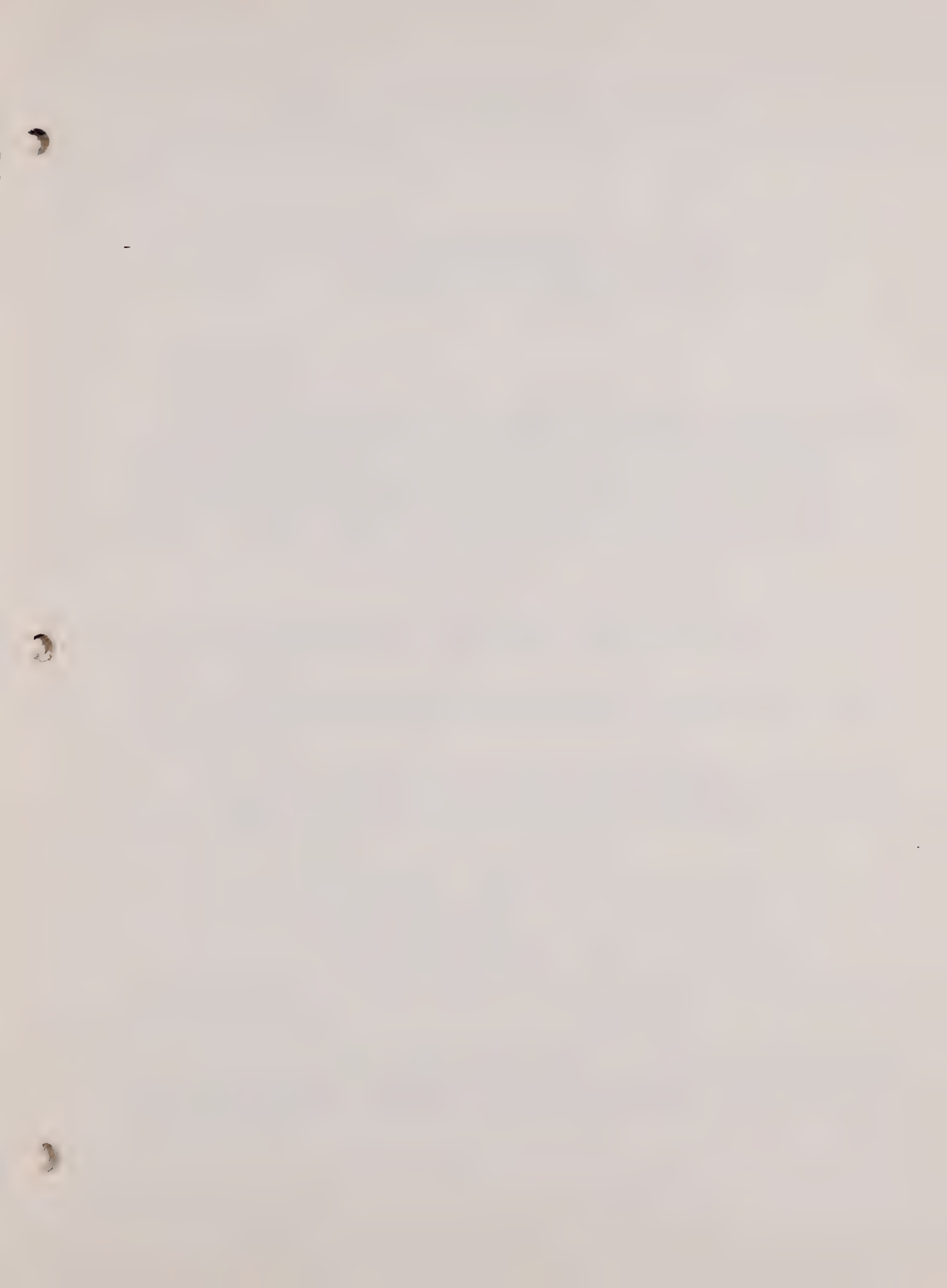
Reference Drawings

2266-4708	1D
2266-4708	2D-1
2266-4708	2D-2
2266-4708	2D-3

Recommended Test Equipment

<u>Quantity</u>	<u>Type</u>
1	Oscilloscope (not required for calibration)
1	DVM (5-digit)
1	2270-3007 Operational Verification Fixture Asm.
1	2270 Card Extender

*Customers who have received formal 2270 System training from GenRad.



ACZ Module Calibration – Section 2

2.1 General Description.....	2-1
2.2 Set-Up Procedures.....	2-2
2.3 Current Amplifier Offset Adjustment....	2-3
2.4 Board Accuracy Checks.....	2-3

2.1 GENERAL DESCRIPTION

This 2270 ACZ Module Accuracy Check and Calibration program is intended for factory use only, however it can be used in the field for module checking and calibration providing certain considerations are taken into account. Namely – system acceptance is based solely on the successful running of the OVP and this program should not be part of any acceptance criteria. If the ACZ fails the OVP the calibration portion of this program can be run in an attempt to correct the error. If the failure persists then the module must be replaced.

The program is divided into three sections as follows:

1. A basic test of the ACZ control and status registers. These tests must be run successfully before proceeding to subsequent testing. (For more details see Appendix A).

2. Current Offset Adjustment. This procedure allows the user to adjust the current to voltage converter offset for 0 V. It required a 5 digit DVM and a 152 ohm resistor.

3. Board Accuracy Checks. This section operates the ACZ as a parallel admittance meter. As such, it displays the measured results in terms of CP, GP, and RP parameters. After completing 30 measurements, the following results are output for each parameter.

- . Highest measured value.
- . Percent deviation between highest and average value.
- . Average (of 30) value.
- . Lowest measured value.
- . Percent deviation between lowest and average value.

No further adjustments can be made to effect these results. If these tests fail, check using the OVP. If this fails, change the module.

The above features and how they operate are readily learned using the system. Some additional information is required interpret the significance of the diagnostic messages that are output during the initial testing of the ACZ. (See Appendix A).

2.2 SET-UP PROCEDURE

- a. Power down the 2270.
- b. Install the ACZ Module Board in its slot in the measurement cage using a card extender.
- c. At least one scanner board should be installed in the first slot of the scanner cage and an instrument mux board installed in the measurement cage.
- d. Power up the system.
- e. Install the 2270 XXDP+ system disk cartridge in the disk drive and run it up.

Note

User must be booting from the XXDP+ disk.

- f. Push the 2270 initialize button after the disk drive has indicated it is ready.
- g. Key in the following command string to load and run the ACZ module test program.

R ZMACRG

The GR display should respond with the following message:

```
.....
.
.  ACZ MODULE TEST PROGRAM:  VERSION 05, OCT-80
.
.  *****
.  **                               **
.  **  ACZ PROGRAM LIMITS 35000 TO 107000  **
.  **                               **
.  **  TO RETURN FROM ODT ENTER  66574  **
.  **                               **
.  *****
.
.  FOR HELP PAGE, TYPE 'ESC'
.
.  Be sure J6 pins 1 & 2 are shorted together
.
.  TO CHANGE VERSION NUMBER TYPE 'I'
.
.  This program is set-up to test boards of version #06
.
.  All 'unknowns' must be removed from the ACZ Terminals
.  at this time.
.
.  > > > >  TO CONTINUE, PRESS RETURN < < < <
.
.....
```


IMPORTANT NOTE

In troubleshooting a defective ACZ board it may be necessary to perform the tests in Appendix A.

2.3 CURRENT AMPLIFIER OFFSET ADJUSTMENT

This section deals with the only adjustment that one can make on the ACZ module.

To do this procedure the operator needs an extender board (2265-4711), a 5-digit DVM, and a 152 ohm resistor.

- a. Set ACZ status as follows:

* * * ACZ Module Status * * *

Voltage Level ----- 1 VRMS

Frequency ----- OFF

Bias ----- OFF

Range ----- 2

Measurement Mode --- 8 Meas.

Scanner Pins ----- High = Open, Low = Open, Guard = Open

Pin Auto Increment is Disabled

Note

Do not attempt to run the ACZ with the frequency set to zero. The program will hang-up when it starts the ACZ. The board timing is derived from the operating frequency.

- b. Connect a 152 ohm resistor between the anode of CR4 and anode of CR7 (across the ACZ input).

- c. Type Y in response to the question:

"Do you wish to make any changes (Y/N)?" (Have you done 3?)

If step a. is done, do not answer question and proceed to step d.

- d. Set DVM for DC Volts and connect as follows:

- Lead to analog ground (CR6 anode - unbanded end)
+ Lead to U57 Pin 3.

- e. Adjust R8 (current amplifier offset) for a DVM reading of zero $\pm$ 0.001, VDC.

2.4 BOARD ACCURACY CHECKS

Upon completion of the current amplifier offset adjustment, the program proceeds to the accuracy checks. The display is as follows:

* * * ACZ MODULE STATUS * * *

VOLTAGE LEVEL ----- 1 VRMS
FREQUENCY ----- 10 KHZ
BIAS ----- OFF
RANGE ----- 0
MEASUREMENT MODE -- 8 MEAS.
SCANNER PINS ----- HIGH = OPEN, LOW = OPEN, GUARD = OPEN

PIN AUTO INCREMENT IS DISABLED

Do you wish to make any changes (Y/N)?

>

Before responding to the question take a look at Table 1.

The program expects you to connect standard components (shown in column 3) across the ACZ input (CR4 Anode - CR7 Anode).

Having connected the 10-ohm resistor make sure the status is set up as shown. If not, respond to the question with a Y and make the necessary changes. If the status is set up properly, type N <CR>.

The display now shows an * moving from left to right this indicates that the test is being performed and that a sequence of 30 measurements is being taken. Below these measurements are displayed the readings being taken and the average of these readings.

Note

If the operator wishes he may type W. A 'W' will appear at the top right hand corner of the display indicating that the measurement will stop after 1 complete cycle and Wait for a response from the operator. Pressing W again will clear this option.

Having taken readings the operator should compare them with those shown in Table 1, Row 1 to test for module accuracy.

To change the Standard Component the operator presses the R key (at any time) and the status display will return. The component should be changed and the status altered if necessary. (See Table 1.)

Once satisfied that the set-up is correct the operator may proceed with the next test by typing N <CR>.

Note

The ACZ driver program has an optional cross term error correction factor routine built in that is controlled by the 'C' key.

A cross term error is introduced into the CP/GP readings whenever there is any uncompensated phase shift in the amplifiers of the ACZ detector.

When a F.S. GP is connected to the ACZ, a capacitive component appears in the CP reading that does not reflect the true stray capacitance of the ACZ terminals. This CP reading can be either positive or negative depending upon the phase error (LAG or LEAD), and the magnitude of the true stray CP.

The correction factor has its greatest affect on the highest impedance range (range 3) at 10 KHZ. The degree of correction is determined by constants in the program.

While testing the ACZ, it is important that the correction be used only when indicated.

Follow through Tables 1 and 2, changing parameters on the "set-up" as required.

Note

The percentage tolerance figures given indicate the acceptable limits in percent around the nominal RP values. It must not be confused with the percentage figures displayed on the GR monitor. The displayed percentages are referred to the average readings and not to the nominal values.

Table 1

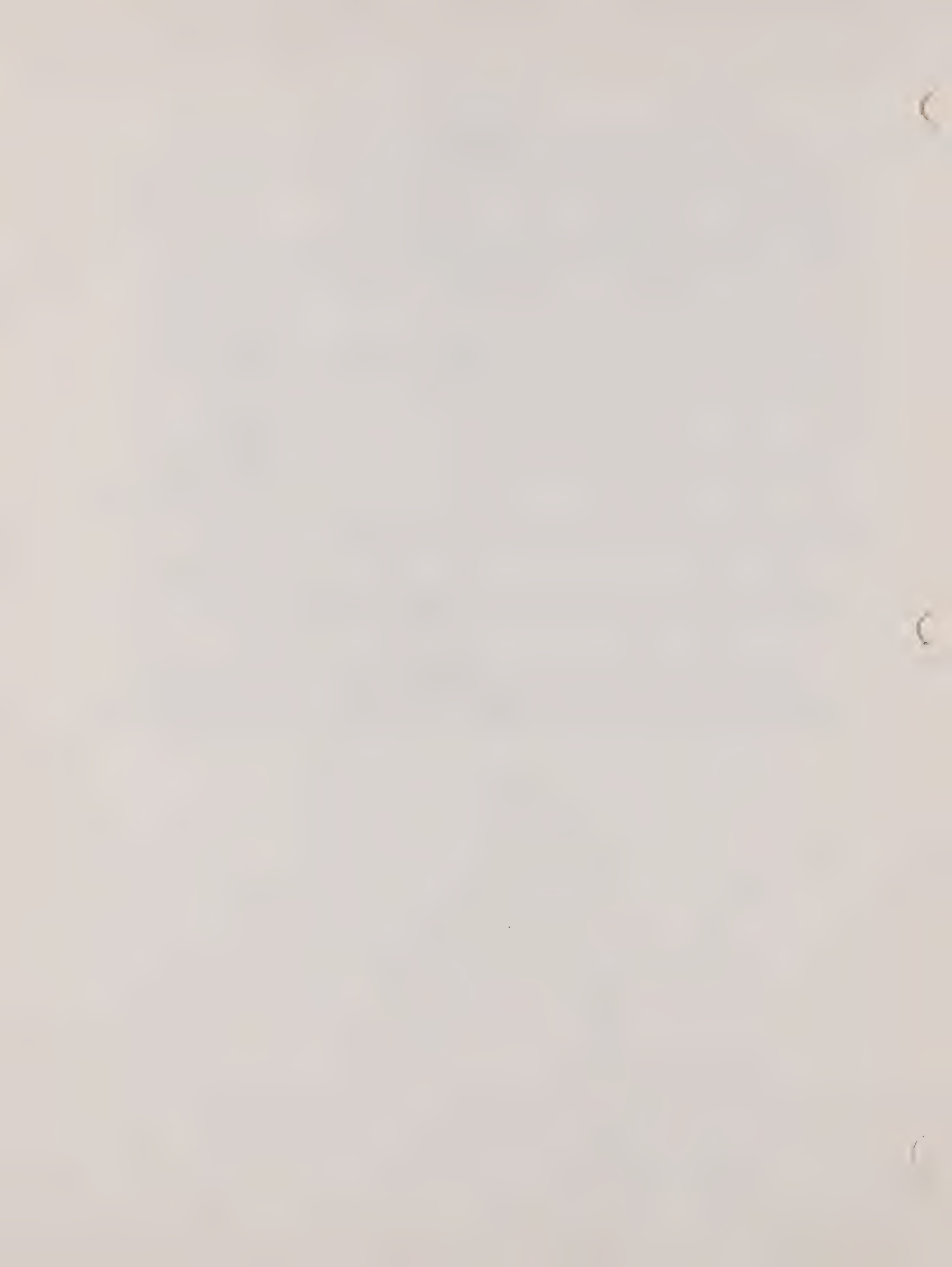
Test	Voltage Level	Freq	Value of Standard Used	Range	RP (AVG) Reading (OHMS)		CP (HI) READING CP (LO) READING (FARADS)
	VRMS	(HZ)	(OHMS)				
1	1	10k	10	0	9.902 TO 10.133		^&+\\& 3.5E-8
					**(-1.15% TO +1.15%)		(-35 nF TO +35 nF)
2	1	10k	132	0	130.58 TO 133.42		^&+\\& 2.7E-9
					(-1.08% TO +1.08%)		(-2.7 nF TO +2.7 nF)
3	1	10k	152	1*	150.79 TO 153.21		^&+\\& 2.3E-9
					(-0.796% TO +0.796%)		(2.3 nF TO +2.3 nF)
4	1	10k	2K	1	1.980K TO 2.020K		^&+\\& 1.8E-10
					(-1.00% TO +1.00%)		(-180 pF TO +180 pF)
5	1	10k	2.58K	2*	2.560K TO 2.600K		^&+\\& 1.4E-10
					(-0.775% TO +0.775%)		(-140 pF TO +140 pF)
6	1	10k	34.7K	2	34.33K TO 35.01K		+1.6E-11 TO -4.3E-12
					(-0.893% TO +0.893%)		(+16 pF TO -4.3 pF)

* To change range while * is moving, enter N for next range or enter P for previous range. Also if you wish to restart the sequence of 30 measurements, just hit the ENTER key.

** Indicates the tolerance limits of RP in percent and of CP in Farads.

Table 2

Test Level	Voltage Freq	Value of Standard Used	Range	RP (AVG) Reading	CP (HI) READING CP (LO) READING	
-	V RMS (HZ)	(OHMS)		(OHMS)		
> > > > ENTER C TO ACTIVATE THE CROSS TERM ERROR CORRECTION FACTOR < < < < <						
7	1	10k	41.2k	3*	40.85k TO 41.55k (-0.850% TO +0.850%)	+14.7E-12 TO +2.7E-12 (+14.7 pF TO +2.7 pF)
8	1	10k	OPEN	3	>5E7	+7E-12 TO +1E-13 (+7 pF TO +0.1 pF)
9	1	10k	1M	3	970k TO 1.030M (-3.00% TO +3.00%)	+7E-12 TO +1E-13 (+7 pF TO +0.1 pF)
> > > > TO CHANGE FREQUENCY ENTER R TO RETURN TO STATUS < < < < <						
10	1	1k	41.2k	3	40.85k TO 41.55k (-0.850% TO +0.850%)	8+1.9E-11 (-19 pF TO +19 pF)
> > > CROSS TERM IS AUTOMATICALLY DE-ACTIVATED WHEN 100 HZ IS SELECTED < < <						
11	1	100	41.2k	3	40.85k TO 41.55k (-0.850% TO +0.850%)	8+1.9E-11 (-310 pF TO +310 pF)
.S 3 > > > > DE-ACTIVATE THE CROSS TERM ERROR CORRECTION FACTOR (C KEY) < < < <						
12	0.2	10k	10	0	9.885 TO 10.115 (-1.15% TO +1.15%)	8+1.9E-11 (-35 nF TO +35 nF)
> > > > ENTER C TO ACTIVATE THE CROSS TERM ERROR CORRECTION FACTOR < < < < <						
13	0.2	10k	41.2k	3	40.85k TO 41.55k (-0.85% TO +0.85%)	+14.7E-12 TO +2.7E-12 (14.7 pF TO +2.7 pF)
> > > > DE-ACTIVATE THE CROSS TERM ERROR CORRECTION FACTOR (C KEY) < < < <						



DCM Module Calibration—Section 3

3.1 General Description.....	3-1
3.2 Set-Up Procedure.....	3-2
3.3 Board Calibration.....	3-4
3.4 Voltage Range Checks.....	3-4
3.5 Current Range Checks.....	3-7

3.1 GENERAL DESCRIPTION

This 2270 DCM Module Accuracy Check and Calibration Program is intended for factory use only, however it can be used in the field for module checking and calibration providing certain considerations are taken into account. Namely, system acceptance is based solely on the successful running of the OVP and this program should not be part of any acceptance criteria. If the DCM fails the OVP the calibration portion of this program can be run in an attempt to correct the error. If the failure persists the module must be replaced.

The features of this program and how they operate are readily learned by using the system. Some additional information is required to interpret the significance of the diagnostic messages that are output during the initial testing of the DCM. (See APPENDIX A)

Table 1
Full Scale Current and Voltage Ranges

RANGE	FULL SCALE VOLTAGE RNG	FULL SCALE CURRENT RNG
0	+ 128 V	+ 160.00 mA.
1	+ 32 V	+ 40.00 mA.
2	+ 16 V	+ 10.00 mA.
3	+ 8 V	+ 2.50 mA.
4	+ 4 V	+ 625.00 uA.
5	+ 2 V	+ 156.25 uA.
6	+ 1 V	+ 39.06 uA.
7	+ 250 mV	+ 9.76 uA.

The DCM software driver provides the necessary link between the DCM module and the GenRad display/keyboard so that the operator can manipulate the module in its various test and calibration modes.

Three basic operating modes are provided.

1. Calibration Mode. Before the DCM board can be checked for accuracy, it must first be calibrated. There are approximately 25 calibration tests and adjustments that must be made before the board can function accurately.

2. Voltage Measurement. Voltage measurements are made over a span of 8 ranges. Under software control, the operator can specify a particular range or can use the auto ranging function.

3. Current Measurement. Current measurements are also made over a span of 8 ranges. Under software control the operator can specify a particular range or can use the auto ranging function.

The operator must select the various operating modes and operating conditions via the GenRad keyboard. Voltage calibration measurements are made at the DCM board. Current calibration and system accuracy checks are made at the operational verification fixture assembly.

Reference Drawings

2266-4712-2D-1
2266-4712-2D-2
2266-4712-2D-3

Recommended Test Equipment

<u>Quantity</u>	<u>Instrument</u>
1	5.5 DIGIT DVM
1	PRECISION DC SOURCE (FLUKE 5100 OR EQUIVALENT)
1	2270-3007 OPERATIONAL VERIFICATION FIXTURE ASM
1	2270 CARD EXTENDER
	NECESSARY CABLES (PRECISION DC SOURCE TO DCM)

3.2 SET-UP PROCEDURE

a. Install the DCM module board in the measurement cage using a card extender.

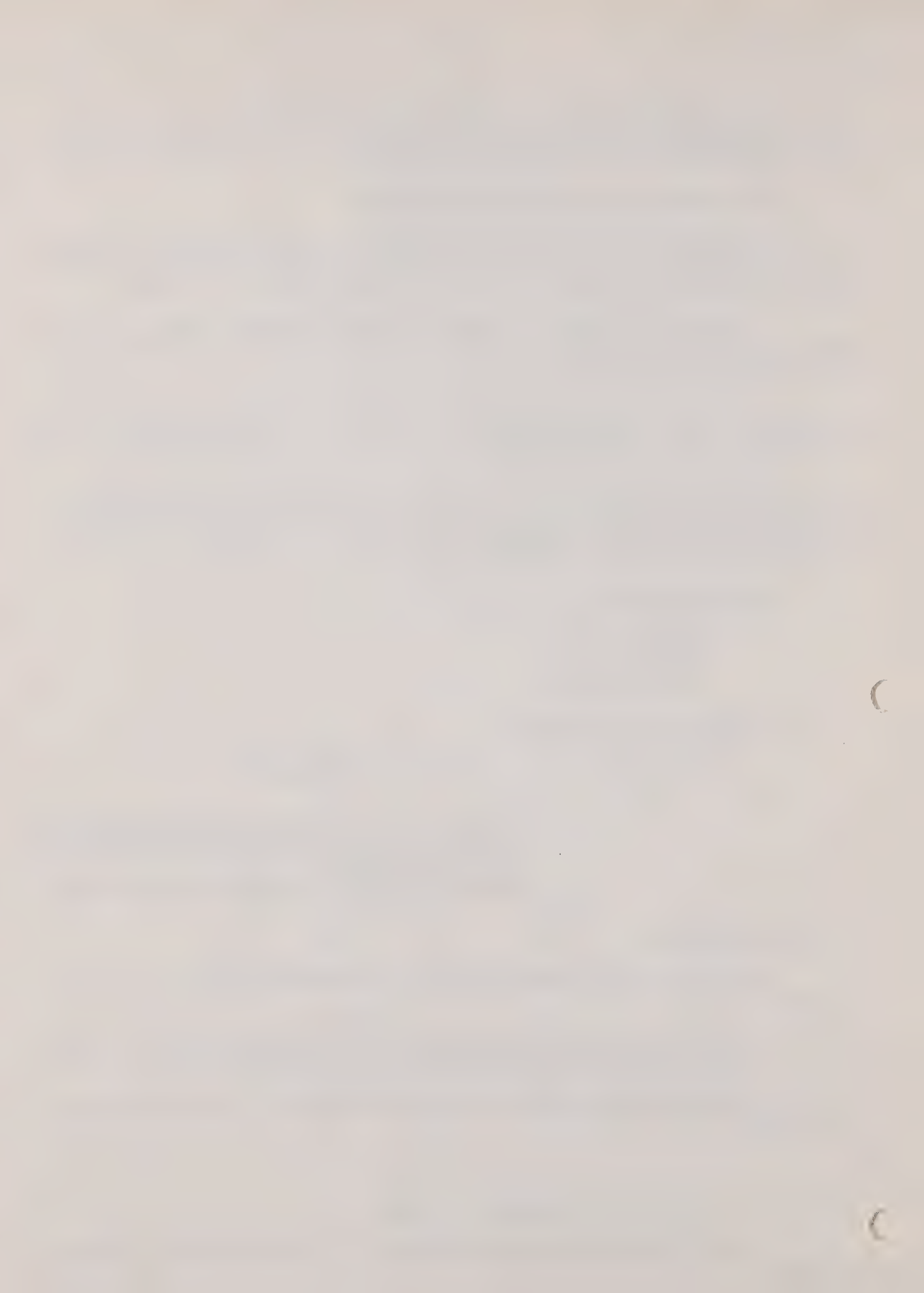
b. Install at least one scanner board in the first slot of the scanner cage and an instrument MUX board in slot 32 of the measurement cage.

c. Install the XXDP+ disk cartridge in the disk drive and then power up the system.

Note

User must be booting from XXDP+.

d. Push the 2270 initialize button after the disk drive has indicated it is ready.



e. Key in the following command string to load and run the DCM module test program.

R ZMDMRG

The GenRad display should respond with the following messages:

```
.....
.
.      DCM MODULE TEST PROGRAM:  VERSION 03,  2-OCT-80      .
.
.      *****      .
.      **      .
.      **      DCM PROGRAM LIMITS 35000 TO 114000      **      .
.      **      .
.      **      TO RETURN FROM ODT ENTER  66452G      **      .
.      **      .
.      *****      .
.
.  FOR HELP PAGE TYPE "ESC" AT ANYTIME      .
.
.  TO CHANGE THE VERSION NUMBER TYPE "I"      .
.
.  THIS PROGRAM IS SET-UP TO TEST BOARDS OF VERSION NUMBER 04      .
.
.  ALL "UNKNOWN" MUST BE REMOVED FROM THE DCM TERMINALS AT THIS TIME      .
.....
```

Note

In troubleshooting a defective DCM Board it may be necessary to perform the tests in Appendix B.

Refer to Appendix B for information pertaining to the pretesting that takes place.

```
.....
.
.  PRETESTING NOW COMPLETE.  IF THE BOARD HAS ALREADY BEEN      .
.  CALIBRATED THE CALIBRATION PRODCEDURE MAY BE SKIPPED      .
.  DO YOU WISH TO SKIP THE CALIBRATION PROCEDURE?      .
.
.  (PLEASE ENTER Y OR N)      .
.....
```

Type "Y" and "RETURN" if the board has already been calibrated and the operator wishes to make accuracy measurements. This action will cause the program to jump over the calibration routine and the monitor should return with the DCM status. Jump to voltage range check, Section 3.4, to begin accuracy testing. If the board is to be calibrated, type "N" and "RETURN". The monitor should return with "TEST 1" in the top left corner of the screen.

3.3 BOARD CALIBRATION

Proceed with the calibration as directed by the display. To advance test steps, type <CR>.

3.4 VOLTAGE RANGE CHECKS

1. Connect PDCS+ to Pin 1 of device adaptor
- 2. Connect PDCS- to Pin 2 of device adaptor
3. Install jumper WT3 to TP1
4. Set board status as follows:

***** DCV STATUS *****

THE BOARD IS SET TO MEASURE VOLTAGE

THE FULL SCALE RANGE VALUE IS 16 VOLTS *

AUTO RANGING IS ACTIVE

SCANNER PINS HIGH = 1A LOW = 2B

*The actual full scale voltage range does not matter as the auto ranging will change the range automatically.

Perform the indicated tests in the following table. Check to see that the board is reading within the correct range.

> > > TABLE 2 (PART 1) < < <

SET PDCS (Vdc)	AUTO RANGE TO (Vdc)	INDICATED READING (Vdc)		

+15.90	16	+15.892	TO	+15.908
-15.90	16	-15.892	TO	-15.908

+8.000	16	+7.992	TO	+8.008
-8.000	16	-7.992	TO	-8.008

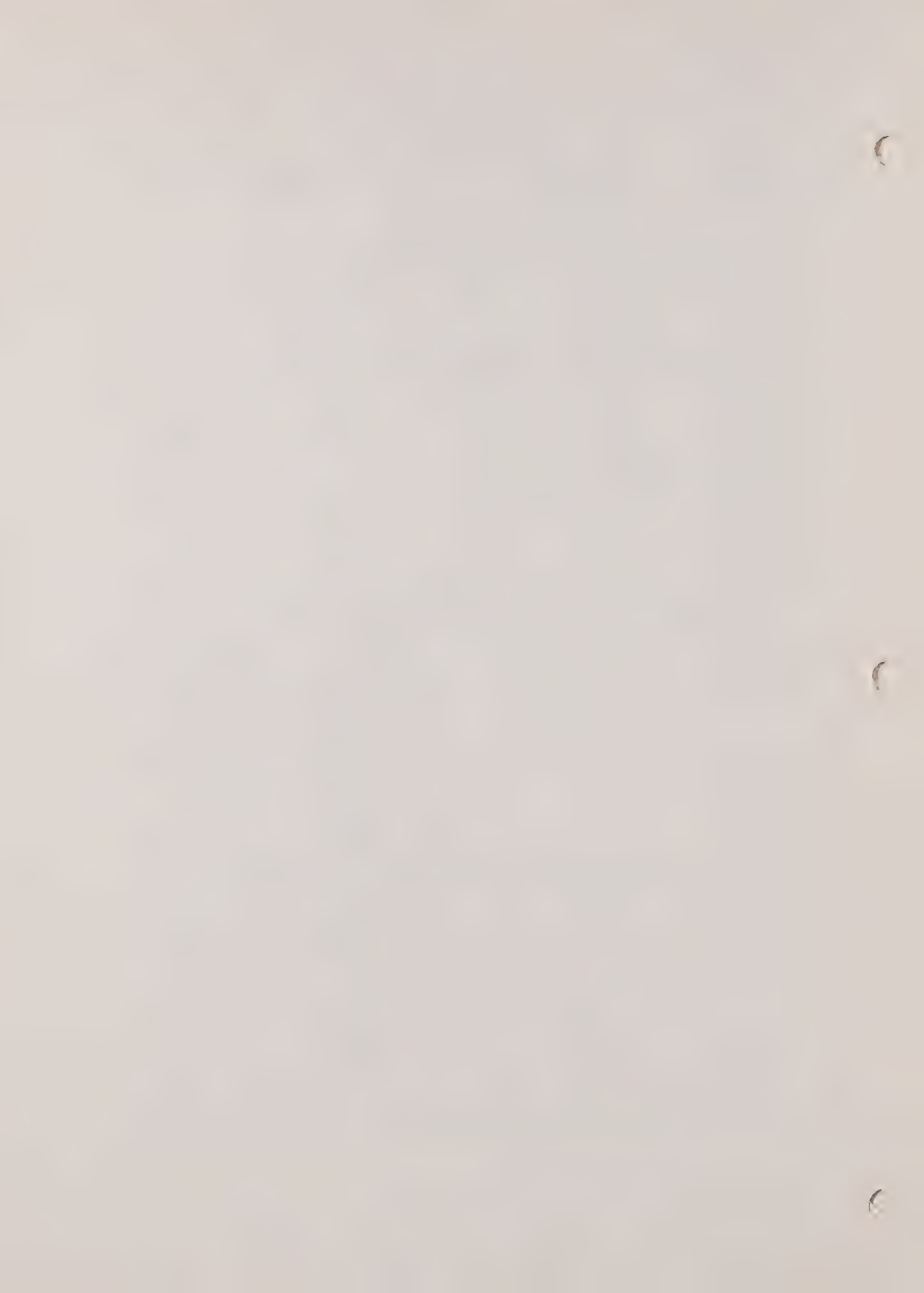
+4.500	8	+4.492	TO	+4.508
-4.500	8	-4.492	TO	-4.508

+2.000	4	+1.996	TO	+2.004
-2.000	4	-1.996	TO	-2.004

+.5000	1	+.4984	TO	+.5016
-.5000	1	-.4984	TO	-.5016

+.2490	.25	+.2482	TO	+.2498
-.2490	.25	-.2482	TO	-.2498

+25.00	32	+24.96	TO	+25.04
-25.00	32	-24.96	TO	-25.04



> > > TABLE 2 (PART 2) < < <

SET PDCS (Vdc)	AUTO RANGE TO (Vdc)	INDICATED READING (Vdc)
-------------------	------------------------	----------------------------

+64.00	128	+63.950 TO +64.060
-64.00	128	-63.950 TO -64.060

a. Remove jumper connecting WT3-TP1.

b. Connect jumper WT1-WT2 (tests K2, K4 1/8 attenuation).

+64.00	128	+63.950 TO +64.060
-64.00	128	-63.950 TO -64.060

c. Remove jumper connecting WT1-WT2

d. Connect jumper WT3-WT4 (tests K1, K3 1/8 attenuation)

+64.00	128	+63.950 TO +64.060
-64.00	128	-63.950 TO -64.060

e. Remove jumper connecting WT3-WT4.

***** This concludes voltage accuracy tests. *****

* Type R for set page.

3.5 CURRENT RANGE CHECKS

a. Set-up DCM as follows:

***** DCM STATUS *****

THE BOARD IS SET TO MEASURE CURRENT

-THE FULL SCALE RANGE VALUE IS 160 mA *

AUTO RANGING IS ACTIVE

SCANNER PINS HIGH = 1A LOW = 2B

*The actual full scale range does not matter as the auto ranging will set the range automatically.

b. Connect PDCS+ to Pin 1 of device adaptor.

c. Connect PDCS- to Pin 2 of device adaptor.

d. Perform indicated tests in the following table. Check to see that the board is reading within the correct range.

> > > TABLE 3 (PART 1) < < <				
SET PDCS	AUTO RANGE TO	INDICATED READING		
+159.000 mA	160 mA	+158.840 mA	TO	+159.160 mA
-159.000 mA	160 mA	-158.840 mA	TO	-159.160 mA
+80.000 mA	160 mA	+79.840 mA	TO	+80.160 mA
-80.000 mA	160 mA	-79.840 mA	TO	-80.160 mA
+45.000 mA	160 mA	+44.840 mA	TO	+45.160 mA
-45.000 mA	160 mA	-44.840 mA	TO	-45.160 mA
+40.000 mA	160 mA	+39.840 mA	TO	+40.160 mA
-40.000 mA	160 mA	-39.840 mA	TO	-40.160 mA

> > > TABLE 3 (PART 1 - Cont.) < < <

SET PDCS	AUTO RANGE TO	INDICATED READING		
+20.000 mA	40 mA	+19.960 mA	TO	+20.040 mA
-20.000 mA	40 mA	-19.960 mA	TO	-20.040 mA
+5.000 mA	10 mA	+4.990 mA	TO	+5.010 mA
-5.000 mA	10 mA	-4.990 mA	TO	-5.010 mA
+1.250 mA	2.5 mA	+1.248 mA	TO	+1.252 mA
-1.250 mA	2.5 mA	-1.248 mA	TO	-1.252 mA

> > > TABLE 3 (PART 2) < < <

SET PDCS	AUTO RANGE TO	INDICATED READING		
+312.0 uA	625 uA	+311.4 uA	TO	+312.6 uA
-312.0 uA	625 uA	-311.4 uA	TO	-312.6 uA
+78.00 uA	156.25 uA	+77.84 uA	TO	+78.16 uA
-78.00 uA	156.25 uA	-77.84 uA	TO	-78.16 uA
+20.00 uA	39.06 uA	+19.96 uA	TO	+20.06 uA
-20.00 uA	39.06 uA	-19.96 uA	TO	-20.06 uA
+9.000 uA	9.76 uA	+8.992 uA	TO	+9.008 uA
-9.000 uA	9.76 uA	-8.992 uA	TO	-9.008 uA

***** This concludes current accuracy tests. *****

DCS Module Calibration – Section 4

4.1 General Description.....	4-1
4.2 Set-Up Procedure.....	4-2
4.3 Voltage Source Calibration and Test.....	4-3
4.4 Current Source Calibration and Test.....	4-4
4.5 Dynamic Tests for Voltage and Current...	4-4

4.1 GENERAL DESCRIPTION

This 2270 DCS Module Accuracy Check and Calibration program is intended for factory use only, however it can be used in the field for module checking and calibration providing certain considerations are taken into account. System acceptance is based solely on the successful running of the OVP. Therefore this program should not be part of any acceptance criteria. If the DCS fails the OVP, the calibration portion of this program may be run in an attempt to correct the error. If the failure persists, the module must be replaced.

The program is divided into three sections as follows:

1. Voltage Source Calibration and Test. Allows user to calibrate and check the DC Voltage Source.

2. Current Source Calibration and Test. Allows user to calibrate and check the DC Current Source.

3. Dynamic Tests. Verification of calibrations and tests using an oscilloscope.

Note

The program begins operating following the initial set-up procedure, which is described in the next paragraphs.

Reference Drawings

2266-4711 2D1, 2 - Schematic
2266-4711 Sh. 1,2 - Assembly

Recommended Test Equipment

<u>Quantity</u>	<u>Instrument</u>	<u>Requirement</u>	<u>Recommended</u>
1	DVM	5-Digit	
1	Oscilloscope		
1	2270 Card Extender		
1	Console Device		VT100 or GenRad Console

CAUTION

This DCS Module uses static sensitive devices.
Therefore use the necessary precautions.



4.2 SET-UP PROCEDURE

- a. Power down the 2270 system.
- b. Install the DCS Module in its slot* in the measurement cage using a card extender.
- c. Install the 2270 XXDP+ system disk cartridge in the disk drive and power it up.
- d. After the disk drive has indicated it is ready, push the 2270 initialize button.
- e. Key in the following command string to load and run the DCS Module Test and Calibration program:

R ZMDSRG

The GenRad console device should respond with the following message:

```
.....  
.  
.   DCS PROGRAM LIMITS 35000  TO  110100   .  
.  
.   TO RETURN FROM ODT ENTER 41624G      .  
.  
.....
```

Note

The test routines used in this procedure are written such that as the operator proceeds through the program to the next step, by pressing the RETURN key on the keyboard, the program sets up various tests and a message is displayed dictating further action.

At this point the system will (following a RETURN keystroke) ask the operator to indicate "WHICH SLOT TO RUN TEST" as displayed on the console device, an illustration of which is shown on the next page.

Following the display of the DCS program limits, which indicates the beginning of the DCS Module Check and Calibration, the system displays the following message:

*See illustration and notation(s) concerning "slot" in the following paragraphs.


```

INPUT                                TO TEST SLOT..#
0 or RET.....SLOT # 36
1.....SLOT # 26
2.....SLOT # 24
3.....SLOT # 22

```

Do not attempt to calibrate or test DCS in Slot #22 if high current source is present.

>

```

*****
*                                     *
*   PLEASE INDICATE WHICH TEST      *
*                                     *
*   YOU WISH TO PROCEED TO:        *
*                                     *
*****

```

>

At this point the console device (GenRad display) can be removed from its shelf and placed on top of the system so that it can be viewed from the rear of the system.

4-3

Adjusts:

R26, R27, R34, R29.

Sequence:

Step # 1 Setup
Step # 2-4 Adjustments
Step # 5-8 Calibration
Step # 9-28 Test Steps

4.4 CURRENT SOURCE (DC) CALIBRATION AND TEST

In this section the DC Current Source can be calibrated and checked.

Note

Values displayed are based on load resistors of
+.01%. If other loads are used, adjust limits
accordingly.

Includes:

- a. (I DAC) - Digital to Analog Converter Calibration
- b. (I DAC) - Digital to Analog Converter Offset Calibration
- c. (I DAC) - Digital to Analog Converter Test

Adjusts:

R66, R59, R63, R102.

Sequence:

Step # 1 Set-Up
Step # 2-5 Calibration Steps
Step # 6 Set-Up - Using precision load resistors across
 TP 86 - TP 87, these range from 10 Ohms to
 10K Ohms.
Step # 7 Calibration
Step # 8-20 Test Steps

4.5 DYNAMIC TESTS FOR BOTH VOLTAGE (V) AND CURRENT (I)*

V..... Dynamic Voltage Tests
I..... Dynamic Current Test
R..... Return to Main

Present system message is listed above before you can continue with
program.

*Uses oscilloscope to test and indicate DC Voltage and DC Current Outputs.

Voltage Test # 1

RANGE = 16 V - Displays expected waveforms. Dynamic test will run following the execution of a RETURN.

The following ranges are then indicated as listed:

<u>Test # 2</u>	RANGE	=	4 V
<u>Test # 3</u>	RANGE	=	1 V
<u>Test # 4</u>	RANGE	=	.25 V

Current Test # 1

RANGE = 128 MA - Displays expected waveform. Dynamic test will run following the execution of a RETURN.

PROGRAM NOW COMPLETE

Driver/Sensor Reference Module – Section 5

5.1 General Description.....	5-1
5.2 Set-Up and Testing Procedures....	5-1

5.1 GENERAL DESCRIPTION

Driver/Sensor Reference Board Adjustment and Calibration program is intended for factory use only, however, it can be used in the field for module checking and calibration providing certain considerations are taken into account. System acceptance is based solely on the successful running of the OVP. Therefore this program should not be part of any acceptance criteria. If the D/S Reference Board fails an OVP, the calibration portion of this program can be run in an attempt to correct the error. If the failure persists, the module must be replaced.

This program "Filename ZDRFRG.BIN" may be used to adjust and verify the D/S Reference Board in either processor-controlled system (11/02) or (11/23), as well as any digital configuration.

Reference Drawings

2266-4705 2D 1,2,3 - Schematic
2266-4705 - Assembly

Recommended Test Equipment

<u>Quantity</u>	<u>Instrument</u>
1	5.5 Digit DVM
1	2270 Card Extender

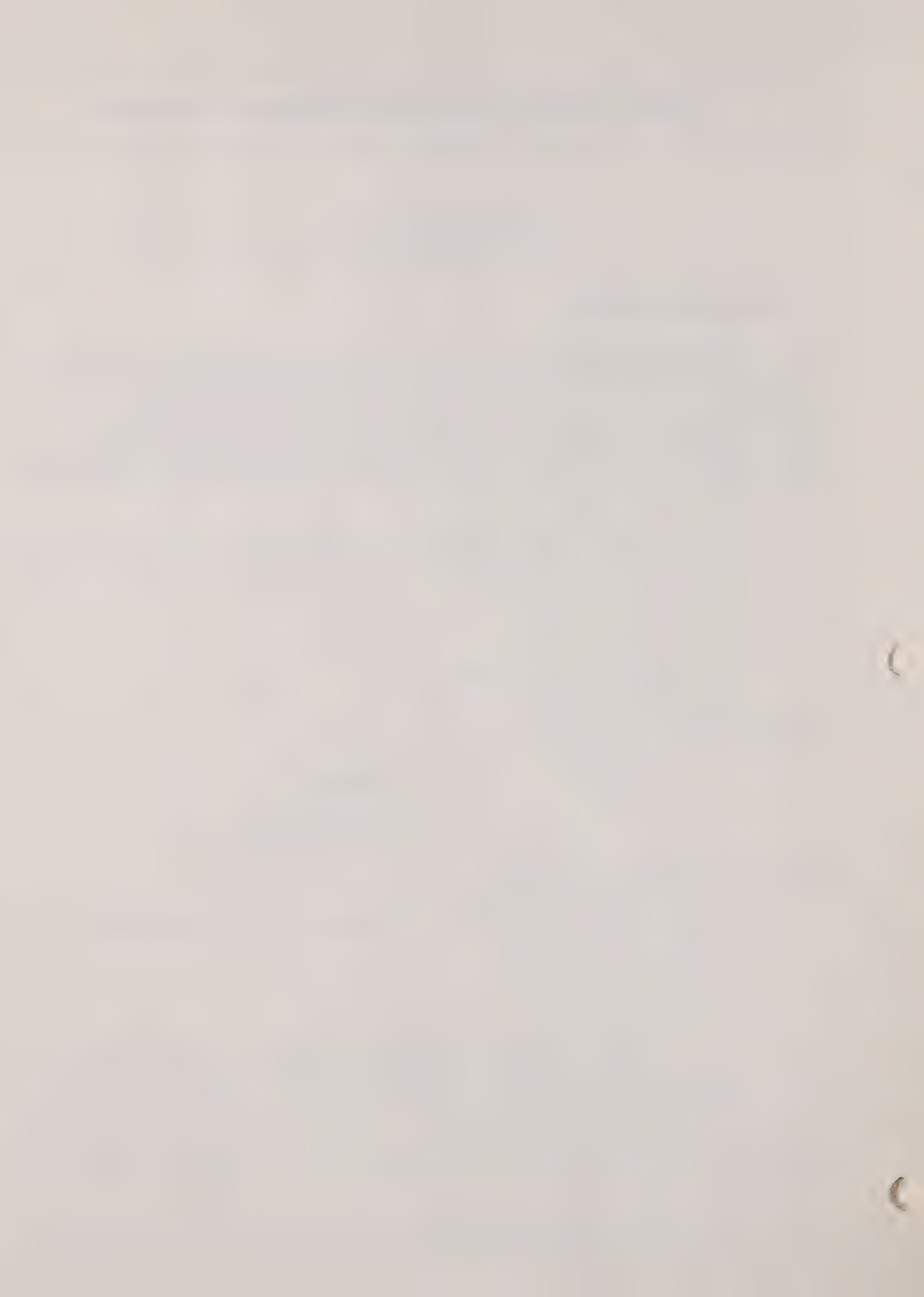
5.2 SET-UP AND TESTING PROCEDURE

- Place the reference board to be tested on an extender board.
- Boot the XXDP+ disk.
- Run ZDRFRG.BIN

Program will ask for cage to be tested. Cage #1 refers to the master cage or location of the first D/S bd. Cage #2 is the location of the slave cage. Exceptions are noted on the display.

- Using a 5.5 Digit DVM connect the ground lead to TP 93 located near Q 18) and the positive lead to TP 1. Adjust pot labeled VPHA (R1) for -5 Volts $\pm$ 60uV.

- Continue program with <CR>. Without moving DVM leads adjust pot labeled "GAIN" for 0 Volts $\pm$ 50uV (R17).



f. Adjust succeeding reference voltages by moving + DVM lead to TP 2 through TP 16 and adjusting corresponding pots for 0 Volts $\pm$ 50uV.

g. Continue program with <CR>. By moving + DVM lead to TP 1 through TP 16 verify -5 Volts $\pm$ 60uV at all points.

h. To run the slave cage reference board or another reference board, it will require rebooting and re-running the program answering the displayed questions appropriately.

Appendix A – ACZ Module

This section describes the steps that the program takes during pretesting time. This section is normally transparent to the operator is the ACZ is basically functional.

The pretest diagnostic works as follows:

a. Tests all 3 ACZ registers to determine if they are talking to the LSI-11. If any fail to communicate, an error message is printed out. Wait for repairs to be made.

ERROR MESSAGE:

THE FOLLOWING ACZ REGISTERS WOULD NOT RESPOND WHEN SLOTTED

STATUS REGISTER DEFECTIVE

SETUP REGISTER DEFECTIVE

DATA REGISTER DEFECTIVE

b. Disables ACZ interrupts and then checks Bits 15, 13, and 11 of ACZ Status Register (all readable bits) for cleared state. In any are set, an error message occurs:

ACZ Status Register (772660) Defective

Reg Bits	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Programmed	0	T	0	T	0	X	X	X	X	X	X	X	X	X	X	T
Measured	1	T	0	T	0	X	X	X	X	X	X	X	X	X	X	T

T = Write only Trigger Bit

X = Bit not used

c. Enables normal ACZ interrupts and then, using bit 12 of the ACZ status register, forces ACZ to interrupt the CPU. If interrupt is not received, an error message occurs:

ACZ Status Register (772660) Defective

(Forced interrupt did not occur.)

d. Enables normal ACZ interrupt mode by setting bit 13 of status register. If unexpected interrupt occurs as ACZ becomes enabled, an error message occurs:

ACZ Status Register (772660) Defective

(Unexpected interrupt occurred as interrupt was enabled.)

e. Checks interrupt enable bit 13 to determine if it was set. If not, output error message.

ACZ Status Register (772660) Defective

Reg. Bits	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Programmed	0	T	1	T	0	X	X	X	X	X	X	X	X	X	X	T
Measured	0	T	0	T	0	X	X	X	X	X	X	X	X	X	X	T

T = Write only Trigger Bit
X = Bit not used

f. Sets ACZ for self check, I mode, 10 KHZ, and range 2, which should cause an overflow interrupt to occur. If not, an error message is displayed, and specifies states of overflow bit (should be set) and Done bit (should be cleared).

ACZ Status Register (772660) Defective

Interrupt did not occur as expected Self Check, I mode, active on Range 2 at 10 KHZ Overflow bit should be set, but it is cleared Done bit is cleared as expected

g. Sets ACZ for self check, I mode, 10 KHZ, and Range 1, which should produce a normal measurement.

If not, error message occurs and states of overflow bit (should be cleared) and Done bit are specified (should be set).

ACZ Status Register (772660) Defective

Interrupt did not occur as expected Done bit should be set, but it is cleared Overflow bit is cleared as expected.

h. Clears all active bits of setup register. Checks that all bits are cleared. If not, error message displayed:

ACZ Setup Register (772664) Defective

Reg. Bits	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Programmed	X	X	X	X	1	1	1	1	1	1	1	1	1	1	1	1
Measured	X	X	X	X	1	1	1	0	1	1	1	1	1	1	1	1

X = Bit not used.

i. Sets all active bits of set-up register. Checks that all bits are set. If not, error message is displayed.

ACZ Setup Register (772664) Defective

Reg. Bits	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Programmed	X	X	X	X	1	1	1	1	1	1	1	1	1	1	1	1
Measured	X	X	X	X	1	1	1	0	1	1	1	1	1	1	1	1

X = Bit not used

j. Starts ACZ (which sets the Data Register to -F.S.) and then before it is changed, read data register, check the most significant bit to be set. If not set, output error message.

ACZ Data Register (77662) Defective

Reg. Bits	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Programmed	X	X	X	1	0	0	0	0	0	0	0	0	0	0	0	0
_Measured	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0

X = Bit not used

k. Waits for the ACZ to finish the measurement in step f. If it does not finish in a reasonable time, error message occurs:

Done Bit did not respond after starting ACZ.

l. Checks ACZ identification code. If not good, error message occurs:

IDENT. Register Defective

Reg. Bits	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Programmed	0	0	0	0	0	0	1	0	0	0	0	0	0	1	1	0
Measured	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0

X = Bit not used

m. Outputs summary of the failed registers in the above tests if any were flagged as being defective.

Status Register Defective
 Setup Register Defective
 Data Register Defective
 Ident. Register Defective

Board problem must be corrected before testing can continue.

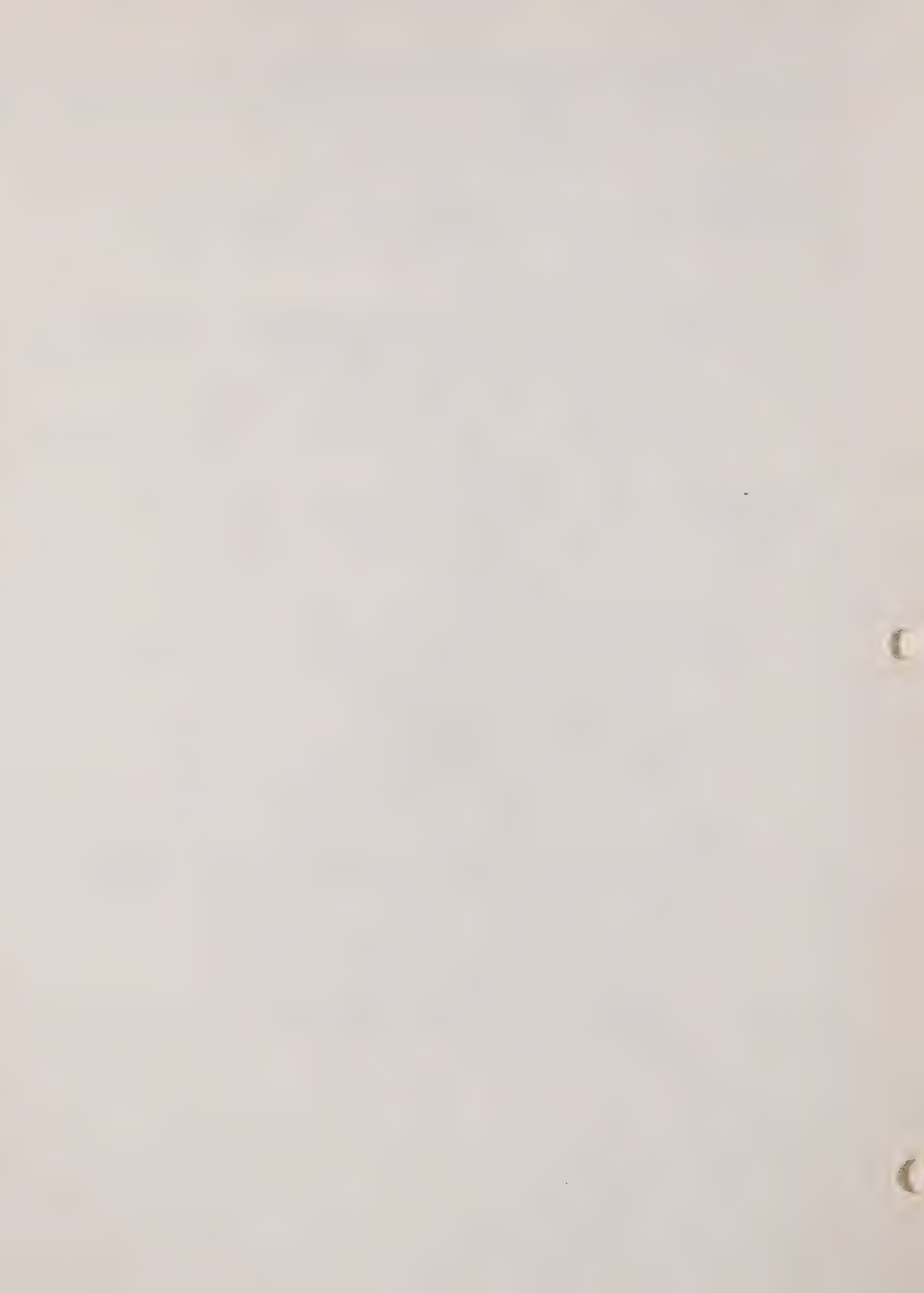
n. Measures self-check capacitor at 1 KHZ, on Range 2. If reading is not within $\pm 3\%$ of 56.9 nF, error message occurs. The program allows the operator to proceed past this failure.

> > > Self Check Capacitor Test Failed < < < <

Normal Value: 5.69 E-8 uF

Tolerance Limits: 5.5193 E-8 to 5.8607 E-8 ($\pm 3\%$) uF

Measured Value = 5.925 E-8 uF.



Appendix B – DCM Module

B.1 Introduction.....	B-1
B.2 Pretesting.....	B-1
B.3 Calibration.....	B-2
B.4 Measurement.....	B-2
B.5 Register Access Definitions.....	B-4
B.6 Definition of Terms.....	B-6

B.1 INTRODUCTION

The 2270 DCM Measurement Module Test Program is designed as a stand alone program to drive the 2266-4712 DCM Measurement Module. The three modes of operation are:

1. Pretesting
2. Calibration
3. Measurement (normal operation).

B.2 PRETESTING

This section is included to describe the steps that the program takes during pretesting time. This section is normally transparent to the operator if the DCM is basically functional.

a. Test both DCM registers to determine if they are talking to the LSI-11. If any fail to communicate, the following error messages are printed out:

STATUS REGISTER TIMED OUT
DATA REGISTER TIMED OUT
WAIT FOR REPAIRS TO BE MADE

b. If no timeout failures occur, the status register is checked to see if all the bits are working. First the status register is cleared. It is then read to see that all the R/W bits were cleared. If they were not, an error message appears.

DCM STATUS REGISTER (172700) DEFECTIVE

REG. BITS	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
PROGRAMMED	T	0	X	X	0	0	0	X	X	X	X	0	0	0	0	T
MEASURED	T	1	X	X	0	0	0	X	X	X	X	0	0	0	0	T

T = WRITE ONLY TRIGGER BIT
X = BIT NOT USED

c. The read/write bits of the status register are then programmed to be set. The bits are checked to see if they respond as being set. If they do not, the following error message is displayed:

DCM STATUS REGISTER (172700) DEFECTIVE

REG. BITS	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
PROGRAMMED	T	1	X	X	1	1	1	X	X	X	X	1	1	1	1	T
MEASURED	T	1	X	X	0	0	1	X	X	X	X	1	1	1	1	T

T = WRITE ONLY TRIGGER BIT
X = BIT NOT USED

d. The data register is now checked for proper operation. First the A/D converter is checked to see if it is working. A measurement is started and a data reading is taken before the conversion is completed. After a pre-defined time, another data reading is taken and compared with the first. The two readings should be different. If they are not, the following error appears.

DATA REGISTER DEFECTIVE

e. The Done Bit is now checked for proper operation. A measurement conversion is started and the Done Bit is checked immediately before the conversion is completed. If the Done Bit is low (conversion complete), the following error message appears:

DONE BIT STUCK LOW

f. The IDENT Register is checked to see if the board IDENT is the same as the program IDENT. If the two IDENTs are not the same, the program IDENT and the board IDENT are displayed. The program version number (last 6 bits) can be changed by hitting I on the keyboard and entering the appropriate version numbers.

B.3 CALIBRATION

The calibration routine runs through a procedure for bringing up the DCM (2266-4712). Instructions for the operator are displayed on the GenRad monitor and board status is automatically controlled by software for each particular test. While in the calibration procedure, the operator can jump back to the beginning of the calibration procedure by hitting a "C" and then successive "RETURNS" until the desired test is reached.

The "F" key will clear the HI and LO recorded data on displayed board measurements.

The "RETURN" key will move the program on to the next test or set of instructions.

B.4 MEASUREMENT

In this mode, the board is set to make measurements. The operator has full control over what and how the board makes a measurement. To change the DCM status, the operator should enter "R", "Y", "RETURN". The operator can set up the DCM as necessary to make particular measurements.

While the board is making measurements, the operator can control:

RANGING

Keying in "N" (Next) puts the DCM on the next higher range (hold range), if the board is at the highest range (128 Vdc or 160 mA.). The auto ranging mode will be activated after the next "N" keystroke.

Keying in "P" (Previous) deactivates the auto ranging mode if it is active. If auto ranging is not active, the range is set at the next lower range.

Stop Measurement

Keying in "S" stops DCM measurement (pause).

Start Measurement

Keying in "Q" restarts DCM measurement (continue from pause). It will not affect any data.

Keying in "RETURN" restarts DCM measurement and clears the HI and LO recorded data.

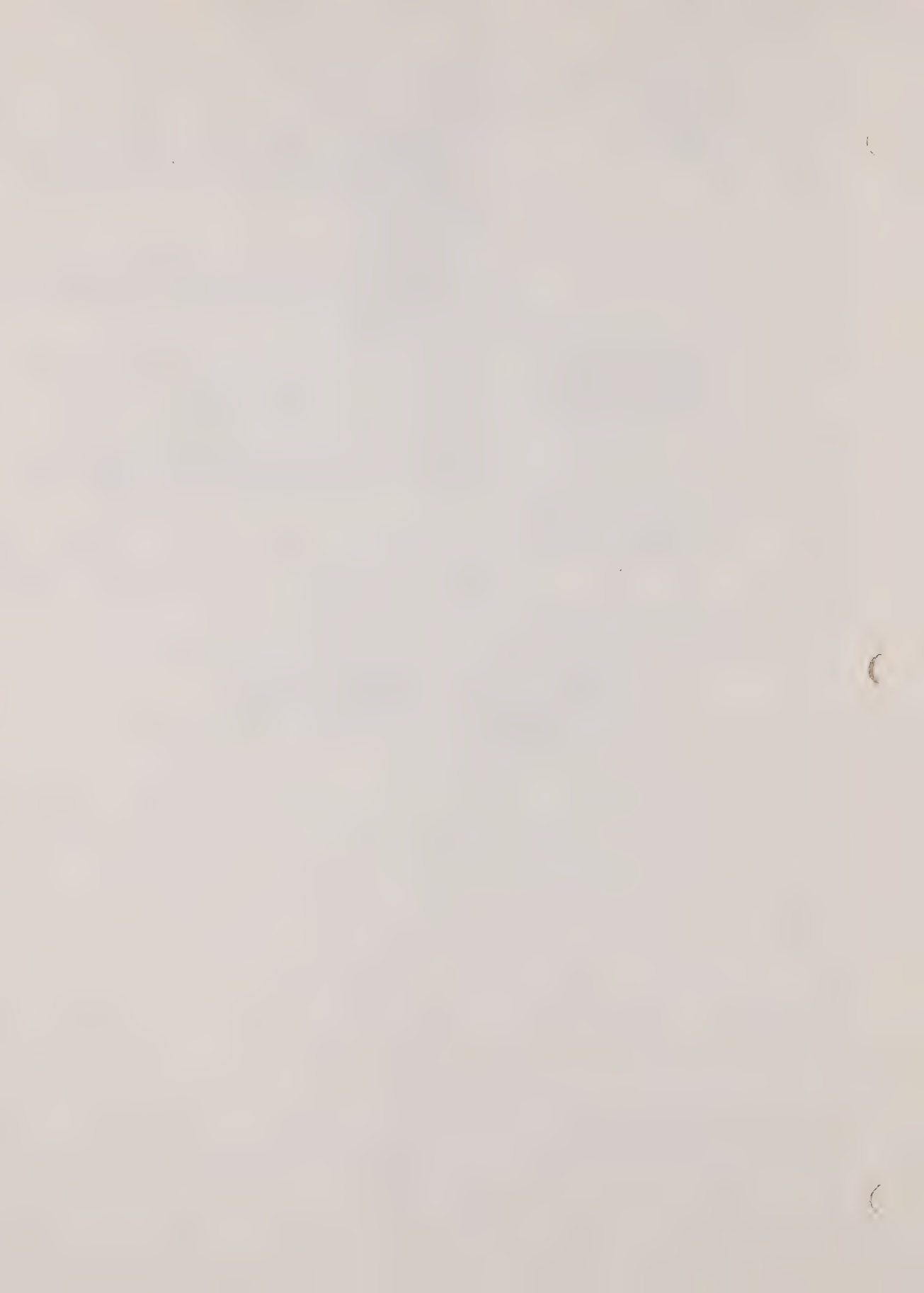
Clearing HI/LO Data

Keying in "F" clears HI and LO indicated data.

Hitting "RETURN" also clears HI and LO indicated data.

The following control keys may be hit at any time:

1. "Z" Returns to beginning of program
2. "R" Jumps to DCM status output
3. "I" Jumps to routine to change IDENT. code
4. "O" Jumps to ODT



B.5 REGISTER ACCESS DEFINITIONS

In the tables below, the following codes are used to indicate the type of access by the CPU to the register bits.

R/W READ/WRITE BIT
R READ ONLY BIT
T TRIGGER BIT (WRITE ONLY)

> > > DCM STATUS REGISTER (172700) < < <				
BIT	OCTAL NO.	ACCESS TYPE	NAME FUNCTION	DESCRIPTION/OPERATION

15	100000	R	BUSY	BOARD BUSY
14	40000	R/W	I/V	VOLTAGE/CURRENT SELECT

13	20000	R	VOL	VOLTAGE OVERLOAD
12	NOT USED			

11	4000	R/W	DCV RANGE	VOLTAGE RANGE SELECT (MSB)
10	2000	R/W	DCV RANGE	VOLTAGE RANGE SELECT

9	1000	R/W	DCV RANGE	VOLTAGE RANGE SELECT (LSB)
8-5	NOT USED			

4	20	R/W	DCI RANGE	CURRENT RANGE SELECT (MSB)
3	10	R/W	DCI RANGE	CURRENT RANGE SELECT

2	4	R/W	DCI RANGE	CURRENT RANGE SELECT
1	2	R/W	DCI RANGE	CURRENT RANGE SELECT (LSB)

0	1	T	START	START MEASUREMENT

B.6 DEFINITION OF TERMS

NAME	FUNCTION
BUSY	The A/D converter is in process
I/V	Current voltage mode bit. (I/V is high for current mode)
VOL	Voltage is over 128 V or 128 V range should be used
V2-V0	Voltage Range Code

BITS	11 (V2)	10 (V1)	9 (V0)	
	0	0	0	= 16 V
	0	0	0	= 4 V
	0	1	0	= 1 V
	0	1	1	= .25 V
	1	0	0	= 128 V
	1	0	1	= 32 V
	1	1	0	= 8 V
	1	1	1	= 2 V

I3-I0	Current Range Code					
	BITS	04	03	02	01	
		(I3)	(I2)	(I1)	(I0)	
		0	0	0	0	= 160 mA
		0	0	0	1	= 40 mA
		0	0	1	0	= 10 mA
		0	0	1	1	= 2.5 mA
		0	1	0	0	= 625 uA
		0	1	0	1	= 156.25 uA
		0	1	1	0	= 39.06 uA
	0	1	1	1	= 9.76 uA	

START	Start conversion. The A/D converter is activated.
-------	---

> > > DCM DATA REGISTER (172702) < < <

BIT	OCTAL NO.	ACCESS TYPE	NAME FUNCTION	DESCRIPTION/OPERATION
-----	--------------	----------------	------------------	-----------------------

15-14 NOT USED

13		R	CNT13	DATA BIT 13 (SIGN BIT)
12		R	CNT12	DATA BIT 12

11		R	CNT11	DATA BIT 11
10		R	CNT10	DATA BIT 10

9		R	CNT9	DATA BIT 9
8		R	CNT8	DATA BIT 8

7		R	CNT7	DATA BIT 7
6		R	CNT6	DATA BIT 6

5		R	CNT5	DATA BIT 5
4		R	CNT4	DATA BIT 4

3		R	CNT3	DATA BIT 3
2		R	CNT2	DATA BIT 2

1		R	CNT1	DATA BIT 1
---	--	---	------	------------

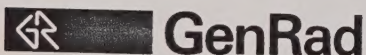
GenRad

GenRad is a software package for the analysis of gene expression data. It is designed to be used with the GenRad database, which contains information on the expression of genes in various tissues and conditions. The software allows users to query the database and retrieve information on specific genes or groups of genes. It also provides tools for analyzing the data, such as calculating the average expression level for a group of genes or comparing the expression levels of different genes.

GenRad is a powerful tool for the analysis of gene expression data. It is designed to be used with the GenRad database, which contains information on the expression of genes in various tissues and conditions. The software allows users to query the database and retrieve information on specific genes or groups of genes. It also provides tools for analyzing the data, such as calculating the average expression level for a group of genes or comparing the expression levels of different genes.

GenRad is a powerful tool for the analysis of gene expression data. It is designed to be used with the GenRad database, which contains information on the expression of genes in various tissues and conditions. The software allows users to query the database and retrieve information on specific genes or groups of genes. It also provides tools for analyzing the data, such as calculating the average expression level for a group of genes or comparing the expression levels of different genes.





GenRad

300 Baker Avenue
Concord, Massachusetts 01742

***BOSTON** • (Sales) 170 Tracer Lane
Waltham, MA 02154
• Tel: (617)890-4900
(Service) Concord, MA 01742
• Tel: (617)369-8770 • TWX: 710 347-0151

***CHICAGO** • 1067 E. State Parkway,
Schaumburg, IL 60195
• Tel: (312)843-5599 • TWX: 910 291-1209

***CINCINNATI** • Park 50, 2002 Ford Circle,
Milford, OH 45150
• Tel: (513)831-9210 • TWX: 810 461-8323

***DALLAS** • 1121 Rockingham Lane,
Suite 100, Richardson, TX 75080
• Tel: (214)234-3357 • TWX: 910 867-4771

***LOS ANGELES** • P.O. Box 19500,
17361 Armstrong Avenue, Irvine Industrial
Complex, Irvine, CA 92714
• Tel: (714)540-9830 • TWX: 910 595-1762

***NEW YORK** • 380 Midland Avenue
Saddle Brook, NJ 07662
• Tel: (NJ) (201)791-8990
(NY) (212)964-2722
• TWX: 710 988-2205

***ORLANDO** • 988 Woodcock Road,
Suite 205, Orlando, FL 32803
• Tel: (305)894-4303

***SAN FRANCISCO** • 2855 Bowers
Avenue, Santa Clara, CA 95051
• Tel: (408)985-0662 • TWX: 910 338-0291
Alaska: • Tel: (907)279-5741

***WASHINGTON, D.C.** • 1701 Research
Boulevard, Rockville, MD 20850
• Tel: (301)424-6224 • TWX: 710-828-9783

***CANADA** • 307 Evans Avenue,
Toronto, Ontario M8Z 1K2
• Tel: (416)252-3395.

Montreal: (514)747-1052
Ottawa: Zenith 88630

***EUROPE** • Norreys Drive, Maidenhead,
Berkshire SL 64 BP England
• Tel: (628)39181 • Tex: 851 848321

***Paris:** (01)797 07 39
***Munchen:** (089)40 18 01
***Milano:** (02)84 66 541 • Tex: 843 320 373
***Zurich:** (01)55 2420
Best: (04)998-4240

***ASIA, PACIFIC and LATIN AMERICA**
Concord, MA 01742 USA
Cable GENRADCO CONCORD (MASS)

*Service Facilities Available

